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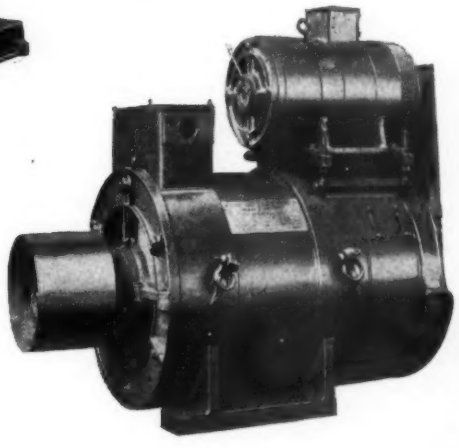

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Lighting and Industrial Accidents

THERE is a close relationship between the frequency of accidents in factories and industrial activity; the improved trade conditions last year were accompanied by a marked increase in the number of fatalities and injuries to workers.

This relationship, however, has actually a negative characteristic when applied to electrical activity, as the greater the consumption of electricity the fewer the accidents due to its use have become, although voltages tend to be higher and a.c. is replacing d.c. Some of the credit for this pleasing paradox must be given to better installation work; but much is due, as is suggested in the annual report of the Chief Inspector of Factories, to a fuller realisation by operatives of the circumstances in which danger may arise.

Mr. D. R. Wilson attributes much of the 14 per cent. growth of electrical output last year to industrial expansion, as "most; if not all, of the new factories are equipped throughout for the use of electricity," and "local generation has been largely displaced by h.v. transmission." The effect of all this has been, he says, to give electrical manufacturers of all kinds the busiest year since 1929.

A point to consider is how far this rapid development of our own industry can be made to bring about a decrease in accidents while increasing productivity in other branches of industry. Much has been done already, as in the substitution of group and individual motor drives for long shafting and in the local control of the motors, to name only the commonest instances; but the greatest contribution that electricity can make to the solution of the safety problem is in providing better lighting.

Adequate illumination is even more important in this aspect than it is in improving works production. Many of the newer installations are on sound lines, some good examples embodying a high standard of general lighting, supplemented by local units suited to the needs of the individual worker, or else flood-lighting by mercury discharge lamps (especially in foundries). But there is still a great number of factories in which the illumination quite fails to meet the requirements of modern industry.

Lack of appreciation of technical principles rather than apathy is suggested as a chief cause of the deficiency. Often even when the candle power is adequate the lamps are not provided with suitable reflectors, and glare is obviously mistaken for effective light. There is much to be said for low-voltage systems, which are reported to be coming into favour, as they are more economical (particularly where there is vibration) as well as safer than local lighting at normal a.c. mains voltages.

It is disappointing to find that lighting in factories has not kept pace with progress in other directions (*e.g.*, ventilation and fencing) in which legal requirements have to be met. While it is good that the greater use of electricity does not increase the number of accidents caused by it specifically, we ought not to rest content until everything possible has been done with its aid to reduce the accident rate due to other causes.

An Improvement in Salaries

IN our issue of June 14th Mr. W. A. Jones, the general secretary of the Electrical Power Engineers' Association, maintained that, so far from having shared in the growing prosperity of the electricity supply industry, some members of power station staffs had actually suffered decreases in salary. He expressed the opinion that prosperity from which the employés did not secure any benefit was not genuine prosperity, and that the existing inelastic National Joint Board schedule of salaries needed revision. Following swiftly upon his article comes a new schedule in which an endeavour is made to improve matters. The first effect is an almost immediate general increase in salaries brought about by

their stabilisation at a higher "cost-of-living" figure for a period of three years. An innovation is the recognition of service. It is strange that a principle generally followed by commercial and industrial undertakings and the public service should only at this late date be introduced into the electricity supply industry. However, now power station engineers will be given an increase after two years' service in the same position with a further rise after their fourth year. We feel sure that no undertaking will consider the increases unjustified and this small additional burden should have a negligible effect upon prices and profits.

Arbitration

THE wise man never goes to law if he can help it, but in commercial matters disputes frequently arise which are not amenable to settlement between the parties themselves. If the point at issue is purely a legal one, probably resort must be had to the Courts. But if, as is more often the case, the matter turns upon whether work has been carried out properly, the decision of an acknowledged expert can be obtained more cheaply and expeditiously. The practice of appointing arbitrators to deal with such disputes has grown considerably in the last few years, thus relieving the Courts, which are already overcrowded with business, and saving the disputants time and trouble. At the beginning of this year an Arbitration Act came into force which gives greater legal force to the decisions of arbitrators, and in this issue Mr. W. Summerfield, who is well qualified to deal with the subject, discusses a number of points arising out of the new Act.

New Generating Plant

PARTICULARS are given in this issue of extensions to selected stations by 471,000 kW. These form part of the additional 650,000 kW to be ordered this year to meet the growth of load referred to by Sir Archibald Page, chairman of the Central Electricity Board, at the National Electrical Convention. The cost per kW installed will be only about £10, after allowing for the inclusion of boilers without turbo-alternators in certain cases, which is very much less than the capital expenditure on new stations, even if such convenient sites were available for them. A large part of the difference will be due to savings in civil engineering and not in electrical work and should be much more than enough to compensate for any higher fuel costs. The allocation of two-thirds of the first 471,000 kW to eight stations with thermal efficiencies of upwards of 20 per cent. (three out of the four with cooling towers) would ensure this. Moreover the new plant may be expected to enable all stations to attain higher efficiencies than at present.

Railwaymen Approve Electrification

WHATEVER the managements of the railway companies think about electrification, the railwaymen are in favour of it. At a meeting of the National Union of Railwaymen last week a report on the subject by the general secretary was approved. This report pointed to the success achieved by the Southern Railway as the result of its progressive policy and considered that the Southern's example should be followed by the other groups in order to keep the country's railway system abreast of the necessity of the times.

Electricity and Efficiency

ELECTRICITY occupies so important a place amongst modern means of increasing the efficiency of industrial operations that it is naturally very closely related to the question of improved management. This being so it will cause no surprise when we state that the I.E.E., E.D.A. and the E.A.W. are lending strong support to the Sixth International Congress for Scientific Management which will be opened on Monday next (July 15th to 20th) at the Central Hall by the Prince of Wales. Such well-known electrical men as Lord Hirst and Messrs. A. P. M. Fleming, J. A. Crabtree and A. P. Young are taking active interest in the proceedings. Some hundreds of papers will be read and discussions will cover manufacturing, distribution, educational, domestic and many other aspects of life in which efficient management means so much to-day. Readers who are interested in the full programme should communicate with Mr. H. Ward, at 21, Tothill Street, S.W. It is part of the electrical man's creed that properly applied electricity means saving of time and labour, and therefore, of course, money, in the home, the office, the factory and the farm. If, as the outcome of the inevitable flow of talk at next week's Congress that creed is more generally adopted, advantage to the electrical industry cannot fail to accrue.

The Government and the B.I.F.

PRIOR to the "economy" cuts in 1931 the Government made an annual grant of £25,000 for the purpose of advertising the British Industries Fair in overseas countries. Since the grant was withdrawn the whole cost of publicity has fallen upon the exhibitors, although the Fair is a means of promoting export trade to the advantage of non-exhibitors and the country generally. The British Textiles Exhibitors' Committee, of which Lord Derby is president, has adopted a resolution urging that the grant should be restored and a copy has been sent to the Parliamentary Secretary to the Dept. of Overseas Trade (Lt.-Col. Colville). As great believers in the value of the Fair to British industry we welcome the resolution and trust that a prompt and favourable response will be received.

Demand and Consumption

THE use of the expression "lighting peak" to indicate the maximum demand on a power station has long been recognised as inaccurate. A paper read by Mr. Seeger at Berlin (see page 60) contains much data in support of the view that an increase in lighting connections improves the station load factor, a greater demand being accompanied by a consumption of twice to three times the equivalent amount in typical instances, especially with a two-part tariff. It is shown that everywhere the lighting load, which provides more than half the revenue, is proof against depression and that, in spite of the rapidity of its development during the past fifteen years, there are no signs of saturation, even in those countries that are most fully developed.

A Reason for Partiality

AT a meeting of the Institution of Gas Engineers a speaker complained of the "partiality" of some public authorities for electric street lighting. Such partiality is not confined to this country, as Mr. Seeger shows. On the Continent during the past five years there has been a rapid increase in the number of public electric lamp standards. In towns this has been generally at the expense of gas; in country districts, previously underlighted, electricity is almost exclusively used. Under modern traffic conditions, the best form of illuminant is demanded.

Engineering Cavalcade

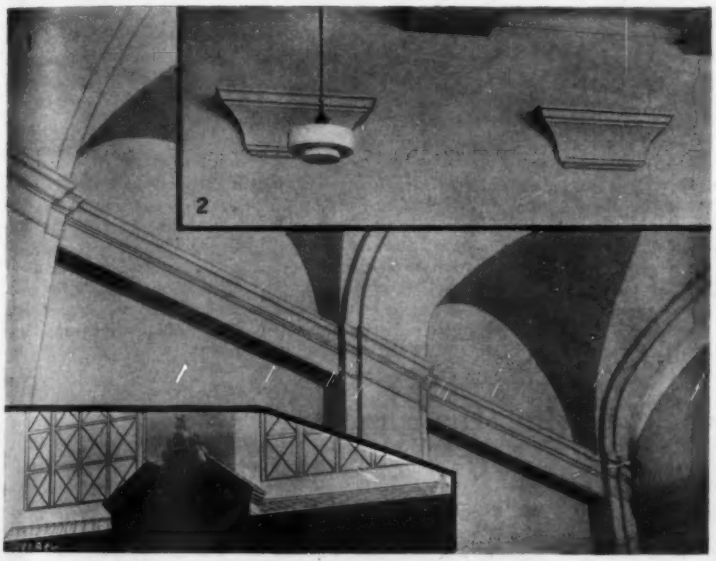
THE Science Museum at South Kensington is not merely a refuge for historical relics. It displays also examples of the most notable advances in engineering. Among additions made in 1934, according to the latest annual report of the Advisory Council (Stationery Office, 1s.) are a model of Battersea power station, a hollow turbine blade, a "Grid" pulverised fuel burner and Diesel engines for transport and other purposes. This interest in recent development makes more noticeable the absence of new items representing progress in electric traction and marine propulsion. As well over a million people visit the Museum each year, it is important that they should gain a correct perspective of the trends of evolution.

The Kingston Guildhall

THE new Guildhall at Kingston-upon-Thames, the building and equipment of which have cost £130,000, was opened on July 3rd. The building has a semi-circular north frontage providing office accommodation for various municipal departments. On the south side the points of the crescent are joined by a rectangular two-storey main block comprising the magistrates' courts on the ground floor with a council chamber, committee rooms, and mayoral suites above. Sir Aston Webb & Son were the architects and Messrs. Albion T. Snell & Partners the consulting engineers.

The larger apartments are ventilated on the plenum conditioned air system, while general heating is by means of hot-water radiators on the electrode boiler thermal storage principle, carried out by Sulzer Bros. (London), Ltd. For these purposes energy is supplied by the Corporation Electricity Department at the rate of 4 kWh per 1d. between 8 p.m. and 8 a.m., and at ¾d. from 8 a.m. to 8 p.m., the day rate being subject to revision. The general tariff for power and lighting within the premises is £5 per kW of m.d. plus 0.35d. per kWh consumed, subject to a minimum demand of 72 kW and a minimum consumption of 100,000 kWh per annum.

The plant is laid out particularly neatly in spacious basement chambers, one of which is a sub-station serving both the Guildhall and a central portion of the town distribution area. Metal-clad draw-out type switchgear of a rupturing capacity of 100,000 kVA controls the two 0.2 sq. in. 3,300-V incoming feeders, arranged for paralleling through a coupler. One h.v. branch goes direct to the electrode boiler and two feed four 500-kVA transformers (three Foster and one G.E.C.) stepping down to 415 V for distribution through four 3,000-A breakers controlling two internal distributors and eight external l.v. panels fitted with high-rupturing capacity fuses for feeding into the town's network through 0.2 to 0.5 sq. in. four-core cables. The sub-station installation was carried out by the Corporation's staff, the fuses and switchgear being by the English Electric Co., Ltd., and the heavy cables of "Union" and "Telcon" manufacture.

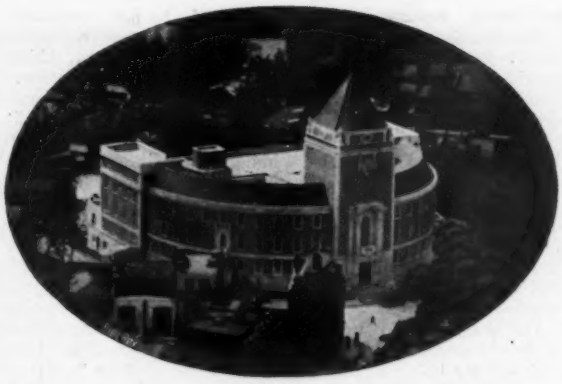


The Ventilating System

(1 and 2) Examples of semi-concealed air extracting duct grills and (3) conditioned air entrance grills in window sills

High- and Low-voltage Boilers

From the sub-station one 3,300-V feeder goes direct to a 600-kW Sulzer three-phase electrode boiler operating at 35 lb. working pressure, through a 100,000-kVA "English Electric" 105-A oil circuit-breaker of special design with a current transformer in each phase and a special c.t. for load regulating purposes. An out-of-balance relay trip circuit is provided and all safety trips are in series with the Sulzer control panel in conjunction with a no-volt release coil. A small auxiliary switch in the tank (actuated by the circuit-breaker operating arm) is arranged to ring the caretaker's alarm bell in the event of the boiler being tripped out of circuit during the night heating period. The boiler circuit is metered on the auxiliary side of the circuit-breaker current and potential transformers by means of two "Metrovick" watt-hour meters (one for day use and the other for off-peak night service) mastered by a Venner time switch.



The electrode boiler is arranged for fully automatic operation for any desired output within the temperature limits (with the minimum load of 120 kW). An "Arca" regulator controls a servo-motor which moves insulating tubes enclosing the electrodes, the tubes being automatically returned to the minimum load position when the current is off. "Satchwell" maximum temperature thermostats and load minimising relays are included, with a Negretti and Zambra flow relay, contact guard, electrode-top enclosure guard, and contact pressure gauge; and a "Drayton" automatic mixing valve controls the flow temperature. There are remote lamp indication circuits and provision has been made for hand control of the boiler load to be assumed if desired.

The two thermal storage tanks are lagged with 6 in. of cork finished with hard cement. Each is 14 ft. long and 10 ft. in diameter, having a combined storage capacity of 11,000 gallons of hot water, while there is room for the installation of a third cylinder.

For the load regulator servo-motor there are two Stothert and Pitt 0.6-h.p. oil pumps; also two Sulzer 3-h.p. hot water storage pumps, four 2-h.p. heating water circulating pumps, grouped on cork foundation blocks to minimise vibration, and one 3-h.p. tank room sump pump. All pumps are driven by Bull "super-silent" three-phase squirrel-cage motors with Igranic starters under remote push-button control.

Domestic hot water is provided by a 500-gal. Heatrae low-voltage three-phase calorifier with a 15-kW (5 kW in each phase) immersion heater under thermostatic three-pole contactor control. The container is heat insulated with 3 in. of granulated cork within a steel outer case, and the

Left: Thermal storage hot-water cylinders with sump pump motor, and (right) portion of sub-station transformer panels

circulating motor-driven pump is of 1 h.p. capacity.

The ventilation and heating of the building are regulated from a Sulzer central control board in the boiler room, which provides push-button control over all the remote equipment. The panels are fitted with Ferranti indicating ammeters and one "Cambridge" panel provides distant temperature indication from thirty-six positions, twenty-nine of the resistance thermometers being within the building and six in the various hot water vessels, while a watertight thermometer indicates the outside temperature. For control purposes the heaters are divided into six groups, each serving a block or wing of the building. On the staircases and in corridors the hot water radiators are of the "National" flat-back type recessed into the walls, while elsewhere "Reyrads" are placed under the windows.

The magistrates' courts, council chamber, and larger committee rooms are ventilated on the plenum system, conditioned air being admitted through grills at floor level and also in the sloping window sills. The vitiated atmosphere is extracted through grills concealed in decorative cornices just below ceiling level in the opposite windowless walls on the corridor side. The necessary ducts were formed within the walls during construction, being of the Christiani and Nielson cell-concrete type, reinforced with cement rendering on the outside.

The air intake is through a "Millbank" oil film filter comprising eight galvanised iron frame sections, each 18 by 18 in. sq. and the air heaters are of the "Excelsior" pattern. Four changes of air per hour are provided for, the "Sirocco" extracting fans with "Bull" motors and "Texrope" drives being accommodated in a special chamber in the clock tower. A 2-h.p. fan extracts 5,020 cu. ft. of air per minute from the law courts, while a 2.5-h.p. fan extracting 5,650 cu. ft. per min. serves the council chamber and a 1.5-h.p. fan extracts 4,880 cu. ft. per min. from the committee rooms, the three larger of which have Merryweather false end-walls that can be lowered by hand winches into recesses in the floors, so forming a single apartment of considerable length.

Internal Distribution

From the sub-station step-down transformers two feeders pass to a panel in a distribution chamber, where the energy consumed is registered on an m.d. plus kWh basis by "Aron" meters (with one check meter) mastered by a Venner time switch. Thence one circuit goes to a service-power board and the other to a lighting board of the metal enclosed type on steel frames bolted to the walls. Each is controlled by an Ellison 300-A oil switch, which feeds through a bus-bar chamber at the bottom and Weekes "Safety" type switch-fuse gear to a wiring chamber at the top. Ferranti watt-hour meters are provided in the sub-circuits serving the calorifier, boiler house auxiliaries, and the housekeeper's power and lighting circuits.

The internal work was carried out by Electrical Installations, Ltd., with sunk type sub-distribution boards (fitted with Sanders fuses) made to the architects' specifications to match the decorative schemes, some of the boards having stone fronts. Braided "Maconite" wiring has been used for the thermometer and clock circuits and Glover's cables for power and lighting, drawn into G.E.C. conduit, with three-pin interlocked "M K" switch-plugs and Crabtree and Tucker wall switches.

In the general offices are Julius Sax buzzers with indicators, the bell and coloured light staff locator circuits being energised by l.v. mains transformers on each floor. There is also a miniature lamp signalling system between the rostrum and chief officials' tables in the council chamber, each table being connected by a plug fitting into a special flush socket in the floor.

In addition to an automatic book lift between two floors, operated by a 1-h.p. motor, there are two Marryat and Scott passenger lifts, actuated by push buttons, operating at 200 ft. per minute. They are driven by squirrel-cage motors of 12.5 h.p. for full and 6.25 h.p. for half speed, fitted with reverse phase relays.

All the lighting fittings are of G.E.C. make, mostly totally enclosed pendants of various styles designed to the architects' requirements, with occasional enclosed wall brackets. Each of the large bronze-finished fittings in the council and committee rooms contains a central 500-W projector with reflector and eight 75-W and four 60-W lamps equally spaced at different levels. The blue and white main staircase is illuminated indirectly by light thrown upward to the ceiling by two rows of reflector projectors mounted on the balustrade standards.

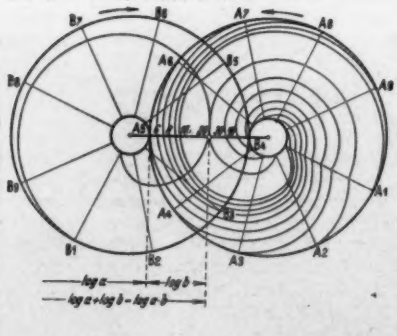
The electric clock system is of the bi-synchronous type (Smith's English Clocks, Ltd.) with a master clock controlled directly by the 50-cycle frequency of the a.c. mains supply. A "carry-over" system is provided that will come into immediate operation in the event of an interruption of the mains supply; this incorporates a vibrating reed which can be calibrated to keep time within two seconds per hour. There should therefore be no measurable error in timekeeping during a normal current failure, during which period energy is derived from a small battery of accumulators that normally operates the slave dials, of which there are thirty-eight throughout the building. They are mostly of the flush fitting type, being circular sandblasted glass discs specially made up to harmonise with the architectural surroundings.

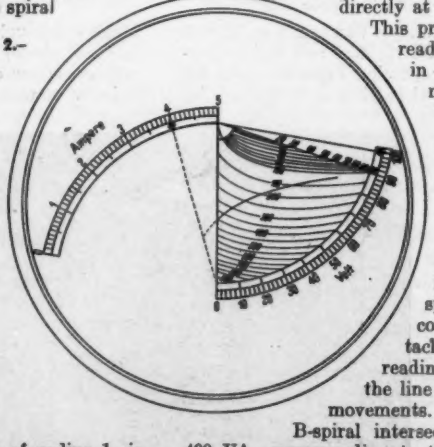
A New Measuring Instrument

A NEW type of instrument for such measurements as the direct indication of apparent power, resistance and power factor depends upon a mechanical method of multiplication and division devised by Prof. F. Spaeth, Münich.

Referring to the accompanying illustrations, from *Elektrotechnische Zeitschrift*, fig. 1 shows two polar logarithmic charts arranged for multiplying *a* by *b*. The spiral in the B circle is obtained by plotting from the inner circle, along the respective radii, logs 1, 2, 3, &c. The spiral in the A circle, starting from the inner end of radius 1, is obtained in the same way; the other spirals, starting from the inner ends of radii 2, 3, &c., are such that the intercept on each radius represents the logarithm of the number on the circumference divided by the number of the radius at the inner end of the spiral concerned. The scales repeat decimally as required.

Fig. 1 (left).—Polar logarithmic charts. Fig. 2.—Applying the principle to a direct-reading volt-ampere meter

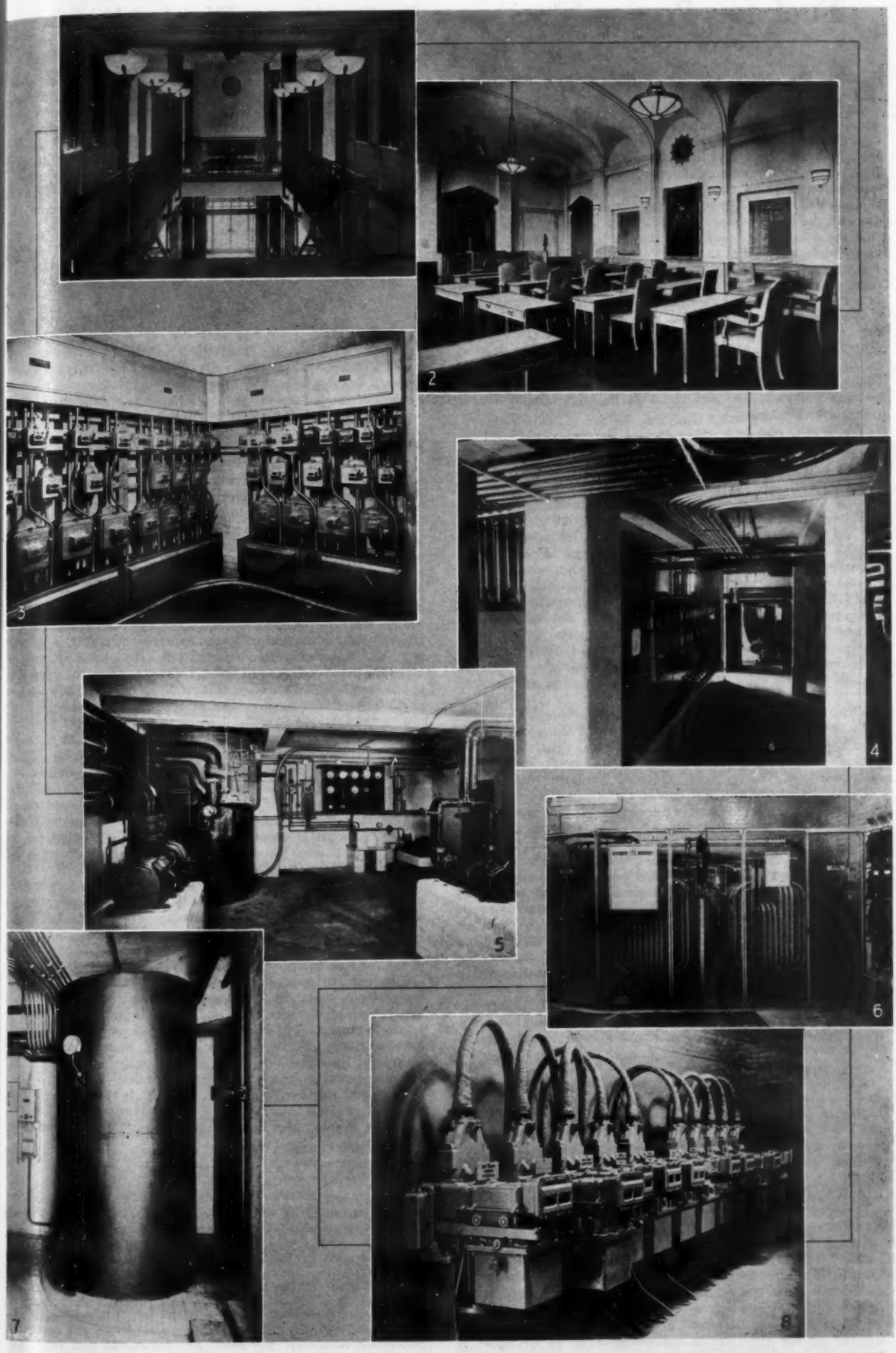




In the combination illustrated the product is read, from the scale formed by the intersection of the A spirals with the horizontal line, at the point where this line is intersected by the B spiral. Thus, in the example shown, 5×4=20. The action is that when the A disc is turned so that A5 is on the reading line the scale on this line starts at log 5; and when B4 is brought on to the reading line the B-spiral intercept adds log 4 to log 5 and indicates the product directly at 20 on the scale.

This principle can be applied to a direct-reading volt-ampere meter as shown in fig. 2. A voltmeter and an ammeter of any type are mounted so that their pointers indicate amperes and volts on the respective quadrant scales. The voltmeter movement carries a balanced aluminium sector, serving also for damping purposes, on which are inscribed a family of spirals corresponding to those on disc A in fig. 1. The place of the B spiral, fig. 1, is now taken by a correspondingly shaped wire attached to the ammeter pointer. The reading-line for volt-ampere values is the line connecting the centres of the two movements. In the case illustrated, the B-spiral intersects the A-family on this line at 400 VA, corresponding to the individual readings 100 A and 4A.

Other applications of the same principle are to a voltmeter and ammeter with automatic logarithmic division to indicate ohmic resistance in d.c. and impedance in a.c. circuits; and to a wattmeter and reactive-power meter combination with direct indication of power factor.



Thermal Heat Storage and Lighting at the New Guildhall, Kingston-upon-Thames. **(See page 39)**

1. Indirectly illuminated main entrance staircase. 2. Council chamber, showing lighting fittings and air extracting duct grills in cornice. 3. Lighting and power distribution chamber. 4. Heating and ventilating remote control board. 5. Electrode boiler with automatic control panel and pumps. 6. Two of the four step-down transformers. 7. Domestic hot water calorifier. 8. High-voltage sub-station intake switchgear.

Fuel for Power Stations. By D. Shipton Wood, A.M.I.E.E.*

Selection and purchase

BROADLY speaking, the cost of generation is mainly controlled by the cost of steam raising. In new stations the type of turbo-generator, boiler, and auxiliary plant installed will ensure good results, but in older stations the engineers must make the best of the plant they have, apart from such minor improvements as are carried out from time to time. Material reductions in costs, therefore, can be effected only by cutting down the fuel cost per kWh sent out.

Much depends on the manner in which the firing is carried out and the boiler house operated, but I think we can assume that the engineers of every undertaking do their best with the boiler units and fuel at their disposal, although, in some cases, the generation engineer does not get all the technical staff necessary to operate his boiler house efficiently. The greatest factor in cheap steam raising, however, is the fuel itself.

The purchase of coal seldom receives the attention it calls for, too much importance being attached to cost per ton and calorific value. The layman, to whom the purchase is often left and who has far too much say in the matter, is bound to be unduly influenced by heat-value and cost; he cannot be expected to realise that the heat he buys cheaply is not necessarily all used.

Buying Coal: Three Stages

The procedure must be divided into three stages: first, the class best suited to the conditions; secondly, the selection of fuels of this class for the preparation of a short list; and, finally, the actual purchase of the coals which best suit the buyer both as regards quality and price.

Class must be decided by the engineer, who knows conditions at his generating stations and is guided largely by experience. He should be able to tell, broadly, what class or classes of fuel appear to be best suited to his grates and also what his operators can do with various fuels; much depends on the personal element. To be able to advise the management in advertising for the required fuel, an engineer must know the markets fairly well, so as to be sure that the fuel he recommends is available and that the price is right. He must also be able to substantiate his contention that such a fuel will prove a commercial proposition.

When the class to be advertised for has been decided, the next important matter is the drawing up of the specification, which must be to the point and must make clear what is expected. One should avoid asking for too much in the way of guarantees.

It is often wise to give contractors the option of offering fuels rather different from the class called for, as occasionally some rather surprising offers are made.

Next comes the selection of coals to be included in the short list. This is not always necessary, as the generating engineer may know fairly well beforehand what fuels will be offered and which he will recommend for purchase, otherwise, any unknown fuels must be put through the laboratory, and, if they come out well, tried on the grates or even given an extended trial. Ample time should be allowed between the receipt of tenders and the date for the placing of contracts.

When the contract fuels are to hand the purchase has only begun; it is not completed until the last ton has been received and paid for. The engineer must take full responsibility for his fuel costs and stand or fall by the results of his recommendations, assuming, of course, that they are acted upon.

The "As Received" Basis

I am in favour of purchasing on the "as received" basis, and I see no difficulty in this method, provided that good feeling exists between the buyer and the seller. If an undertaking has a well-equipped laboratory and a qualified chemist, most agents and collieries are prepared to accept his figures without question, if both sides know and understand each other. In any contract there must always be give and take; it never pays to split hairs or to expect the impossible.

It appears to me unfair to expect any coal to remain constant in value; it is bound to vary from time to time, even if drawn from the same pit throughout, and allowance should be made for this. When fuel is bought on the "as received" basis I think that an average should be struck over the period of the contract, not weekly or monthly, particularly when no bonus is paid but only a penalty imposed. A clause should be inserted in any contract to cancel its provisions if the quality of the coal varies unreasonably so as to make it unsuitable.

As regards guarantees I would ask for them in relation to calorific value as received; ash-content (dry basis); sulphur-content; fusion point of ash; whether caking or coking; and whether swelling or non-swelling. With regard to sizing I would want to know the size and shape of mesh, but would lay down no figures as regards proportion of different sizings contained. I would content myself with calling for representative samples, and would expect the supply to keep well up to that standard, or it would be stopped under the "unsuitability" clause.

Fuels vary differently as regards their characteristics when their sieving tests vary, so that a coal is not necessarily worse if its size falls away; in some cases it is better, or suits conditions better, when rather smaller, especially if segregation has been a trouble.

It is important to keep contractors posted regarding the tests and suitability of their fuels; if they are acquainted with any difficulties experienced, they will know better what fuels to offer for a subsequent contract. Collieries and agents naturally want to supply coals that suit the buyer; if they are treated as part of the team and given the requisite information, they will be better able to supply the fuel wanted or to sound the markets, and may be able to offer a better fuel next time tenders are invited. Sometimes good coals have been purchased but when married they do not blend; if contractors are kept posted regarding such difficulties they can often find what the purchaser has been unable to discover.

An engineer must keep in close contact with the coal trade throughout the whole year and keep his chemist busy, thus earmarking fuels for coming contract periods. Further, he must be allowed to purchase trial lots for test purposes, and so get to know as many coals as possible. By carrying out private tests, also, for collieries and agents (for a fee) he may discover many fuels new to him. A generating engineer who acts in this way will know in advance what coals will be offered, their probable price, the quantity available, and how they suit his conditions. Before he is called upon to make a selection from offers, and even before he sees tenders, he ought to know which class of fuel he is going to advise his chief to purchase.

Co-operation With Collieries Essential

My experience has been that the collieries wish to sell us what we want, not what they are anxious to get rid of; they, like the generating staff, have to look ahead, and we must lead them, not trip them up or expect the impossible.

Price per ton is not necessarily the sole criterion of the value of the coal, neither is the calorific value. The tenderer's test figures are not always correct, and the laboratory results of the undertaking are of more value, particularly if backed up by trial on the grates. It is only after extended operation of a generating station that an engineer can definitely state what class of fuel it will pay the undertaking to purchase. Even when he knows this he must ascertain which individual coals of this class are best suited to his requirements, and it is his business to know most of the available coals in his area.

I cannot too strongly stress the point that there must be complete understanding between buyer and seller throughout the period of the contract, and if a perfect understanding exists there should be no difficulty whatsoever in carrying out the contract on whatever basis the fuel be purchased. The contractor must be able to feel sure that he is dealing with an engineer who knows coal, how to burn it, and what to expect; and, further, that if a complaint is made there must be good grounds for it. He must also know that he can approach the engineer, who must be open with him and put all his cards on the table.

Progress in Belgium

A report issued by the Union des Exploitations Electriques en Belgique shows that, at the end of 1934, the capacity of the generating plants in Belgium amounted to 1,464,000 kW as compared with 1,360,000 kW at the close of 1933, an increase of 7.5 per cent. The aggregate output of the plant comprised in the Union increased from 1,700 million kWh in 1933 to 1,712 million kWh last year, this total being higher than in any previous year. Of the power supplied 10.1 per cent. was for private lighting and domestic purposes, 0.8 per cent. for public lighting, 65.4 per cent. for power, 9.7 per cent. for traction and 14 per cent. for distribution by municipal and local authorities. The report adds that such increases as have been recorded in the past cannot be expected to continue, as there are now only 40 communes in Belgium, with a total of 18,000 inhabitants, to which a supply of electricity is not yet available.

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Lighting Silk Looms. By J. W. Howell, D.L.C., A.M.I.E.E.

The directional and dispersive systems compared

THE lighting of looms will vary as to both the level of illumination employed and the quality of the light supplied. For example, looms engaged on plain cloths of light colour do not require the same amount of light as those on darker materials, but it must always be borne in mind that the worst case has to be catered for, owing to the possibility of a change in the production of any loom. Similarly, patterns or figured material where shadow plays a prominent part must be treated on their merits.

Left: Front of silk loom showing conical iron shade in use; note uneven lighting in the healds and absence of light on the shuttle boxes. Right: Same position with improved lighting

From the warping process the beams are taken and mounted on the looms, the warp threads being threaded through "reeds," which in turn are secured in healds. The healds raise or lower the warp as required, enabling the shuttles to fly through the openings so made and insert the weft in the cloth according to pattern. It is essential that there shall be good lighting in the heald itself so that any breakages occurring in the warp, caused by uneven twisting or defective reeds, can be speedily remedied.

A broken thread, leaving ends on each side of the reed, can cause considerable delay in rethreading and joining, so that a certain amount of light should be directed on to the rear of the loom to reduce this as far as possible. In addition, the shuttle boxes require attention, so that as the spools become exhausted they may be replaced, and where coloured goods are being woven the correct coloured thread inserted.

Still Controversial

The most suitable means of illumination is a matter of conjecture at the moment, although steps are being taken in this country to determine which system gives the most satisfactory results. So far, tests seem to indicate that a decided advantage is gained by the use of uni-directional lighting, even over the generally accepted overhead lighting schemes. It may be that an overhead system using fittings whose light distribution has a strong vertical characteristic will be as effective, but at the moment no proof of this exists. The present average loading can be taken at about 120 W per loom, and a large amount of business in this expanding industry is awaiting supply undertakings and contractors in raising the loading.

Tests to determine at what loading the greatest net profit was gained by the consumer were carried out on eight looms in actual production operating normally on mixtures of silk and artificial-silk goods. In every case well-trained weavers were employed with at least five years' experience. The original lighting, which forms the basis of comparison, consisted of either a 40- or a 60-W drop pendant, while the improved lighting consisted of a series of three wattages using, first, standard dispersive fittings, and then directional fittings lighting from one side only. Weaving is largely an automatic process, and light is required to determine when it is necessary to stop the loom to remedy either machine or cloth irregularities. The benefits derived can be briefly classified under improved quality, increased output and monetary gain.

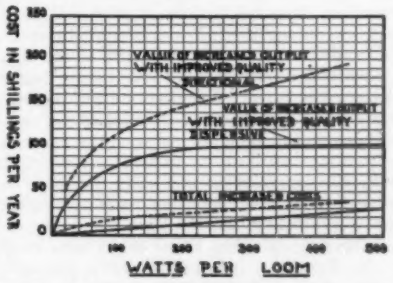
Undoubtedly better lighting assures a vastly superior product, and it is in this direction that the greatest benefits are found. Often material is cut out due to defects which could easily have been corrected in the initial stages had they been seen.

The main causes of stoppages can be analysed as shuttle changing, weft breakage, warp breakage and beam changing. Weft-thread breakage is usually caused by faulty spooling, uneven tension, or seizure of the spool in the shuttle. Such breakage may in turn impede the flight of the shuttle, causing wholesale destruction of warp threads. Uneven twisting will also cause the warp to break at the reed. With the major defect (weft breakage) it was found that, with overhead lighting of 450 W per loom, the time taken for correction decreased by 12 per cent., while with directional lighting of the same wattage it was 40 per cent. In addition, the faults passing through into the finished material decreased by 45 and 85 per cent. respectively. This is significant, for it is assessed that the value of cloth with forty faults per 100 yards is only 75 per cent. of that of good cloth, which means a considerable monetary loss to the mill owner.

The tests showed that while some slight benefit was gained due to increased output the greatest advantage was in the quality improvement. This benefit was due to the fact that thread breakages were more easily detected, and whilst the number of stoppages actually increased the net time lost was reduced, due to a more speedy correction. This means an increased loom efficiency; *i.e.*, the ratio of actual output to possible output is increased. At 450 W per loom the increase in output for both the general overhead and directional systems was practically identical, registering 4.2 and 4.6 per cent. respectively.

For the purpose of assessing the monetary gain thus derived such items as current cost, oncosts, installation depreciation, weavers' wages, &c., have all been based on figures at present obtaining. Thus the results given can be considered as showing fairly accurately the benefits likely to accrue.

Taking only output into consideration, the benefit gained by the introduction of modern systems was not sufficient in any instance to pay for the increased cost of the installation. In the case of 450-W directional lighting a net loss of 24s. per annum was recorded. However, when the value of the improved quality was taken into consideration, and working on a cloth value of 1s. 10d. per yard (manufacturer's price), this loss was turned into profit.



Showing how improved lighting pays for itself

The gross profits, using 450 W per loom, were 195s. with directional and 102s. with dispersive lighting. To obtain this, however, the total increased costs were 40s. and 27s., which leaves a net profit of 155s. and 75s. per loom per year respectively. Thus it will be seen that in the first case the gross profits paid for the increased costs five times over, and in the second four times.

While at 450-W dispersive lighting the gross profit curve in the accompanying graph shows that no further advantage is to be gained, the directional-lighting curve is still rapidly rising, indicating that this figure could be considerably increased, with a consequent increase in net profits.

N.S.W. Electricity Legislation

THE New South Wales Gas & Electricity Act, 1935, was passed into law on April 11th. The first part fixes gas prices and dividends and contains various provisions for the regulation of gas companies. One of the principal features of the electrical part of the measure is the setting up of a "county council" to control the supply of electricity in the Sydney area. Mr. H. R. Forbes Mackay, the general manager of the Sydney City Electricity Department, is appointed the first general manager of the county council and a chief engineer is to be appointed. The Act also sets up an Electricity Advisory Committee to consider and advise upon the generation, transmission, supply and use of electricity, comprising representatives of municipal, commercial, industrial and trade union representatives who are to hold office for three years and will be eligible for reappointment. It is stipulated that in future no main generating plant may be installed without consent. Penalties are specified for infringement of the regulations relating to the installation of "permissible" materials and apparatus. A further section imposes certain regulations upon the Electric Light & Power Supply Corporation, Ltd., which supplies electricity in certain Sydney suburbs.

The New Arbitration Law. By W. Summerfield, M.A., B.C.L., LL.B.

The position of the technician

COMMERCIAL differences and disputes are liable to occur even in the best regulated industries, especially where contracts involve the supply of technical goods or services or the construction of works necessitating technical skill. Such differences are commonly referred for settlement to arbitration tribunals in preference to courts of law, for the former offer the considerable advantage that the referees may be selected from the ranks of those whose technical qualifications render them peculiarly suited to try the issues between the parties, according to the particular section of industry or commerce affected by the contract.

The courts themselves heartily endorse, as a general policy, resort to such technical tribunals where legal considerations are subordinate to the technical issues of fact. As that very eminent commercial judge, Lord Justice Scrutton, said in the leading case of *The Metropolitan Tunnel and Public Works, Limited, v. London Electric Railway Company* (1926): "It is eminently desirable, in all business matters, that parties who have made a contract should keep it"—in referring to a contract between the parties to go to arbitration instead of embarking upon litigation; and "it is becoming increasingly the practice to insert in contracts for the sale of goods, building contracts and engineering contracts of all sorts a clause by which the parties agree to refer all their disputes, or a certain class of them, to an arbitrator."

Increased Powers of Arbitrators

The Arbitration Act, 1934, which came into operation as from January, 1935, aims to strengthen the hands of arbitrators by conferring upon them increased and extended powers approximating their functions to those of judges. Thus, the award of an arbitrator is now given the status of a judgment of the Court. This innovation should be helpful in enforcing payment due from a party abroad for whom work has been executed, since foreign courts have as a rule reciprocal arrangements with the English courts whereby each is prepared to use its machinery to secure obedience to the decrees of the others.

Again, arbitrators may now secure full legal authority to enter upon land or buildings in the possession of a disputant party for the purpose of inspecting the subject matter in dispute, so that being equipped with the necessary technical knowledge they may provide themselves, simply and expeditiously, with the information and data necessary to enable them to come to a decision upon the issue as to whether, for example, the works contracted for have been executed with reasonable efficiency or whether there are defects requiring to be remedied. Similarly, arbitrators are authorised to conduct practical experiments and thus to secure factual or expert testimony.

Another important innovation is the power conferred upon arbitrators to make interim awards. Where a contract comprises the execution of works under numerous headings, the contractor may be faced with a refusal to pay the agreed contract price on the ground that some of the work is defective. Upon that refusal there frequently follows a demand for arbitration. Such an examination into the dispute may involve the determination of two issues, *viz.*: Is the contractor in default? If so, to what extent? Under the old system it was highly inconvenient for the parties to be compelled to wait until the conclusion of the whole of the arbitration proceedings to learn the full result, since in the meantime payment to the contractor was held up, and the other party did not know quite where he stood in relation to the use of the machinery or equipment installed or the building constructed or the like. Under the new Act the interim award may determine the liability quite early on, so that if the contractor is adjudged to be in default the measuring up or estimating of the defective work can be completed at a later stage; meanwhile, the contractor becomes entitled to immediate payment in respect of such portion of his completed work as is indisputably executed according to the requirements of the contract, pursuant to the findings of the interim award.

Possible Bias

In one important respect, however, the new Act renders the position of the technician more difficult than it was before. Numerous forms of contract are in use at the present time under which the technical expert responsible for the supervision of the execution of works is made arbitrator upon differences or disputes which may arise either during the construction or installation or afterwards (*e.g.*, during a "maintenance" period). Such an expert, being retained by one of the parties, may, in fact, not be the ideal person to select as arbitrator. For an arbitrator discharges judicial functions and in that capacity should exercise strict impartiality between the parties. Such a detached mind is extremely difficult to preserve where one of the disputant parties is the employer of the referee. Furthermore, the technical skill and diligence of the referee himself may be the very issue to be tried, so that he may be called upon to act as judge in his own cause. An electrical engineer, for example, who finds himself called upon to decide whether an electrical installation supervised by him has been adequately executed or not is in an invidious position.

Provided, however, that both parties to the contract clearly understand who is the arbitrator appointed under the contract and his personal position no real harm can be said to be done, for they may be presumed to understand their own business best. But if the relationship of the arbitrator to one of the parties to the contract was concealed from the other, the law has in the past thought it reasonable and proper to accede to an application made by that other party to be freed from the obligation to submit to that arbitrator. The vital factor in such cases was the element of concealment or deception. A similar view was often taken by the Court where the referee was personally unsuitable—where, for example, his own technical skill was in question in the dispute.

The new law, however, goes very much further. It is now provided that an agreement to refer to arbitration may be rescinded by the Court even when the party applying for relief was under no misapprehension as to the arbitrator when he agreed to submit to him—if he is able to show to the Court that the particular arbitrator either is not an impartial party or that he may be likely to prove biased. And upon similar grounds arbitration proceedings embarked upon may be stopped by order of the Court.

Reason for the Reform

A reason assigned for this somewhat startling legal reform is that technical supervisors of works are so often nominated as arbitrators by arbitration clauses contained in standard forms of contracts. Now standardised forms of contract used in a particular industry have enormous advantages. They do, however, it is said, present this difficulty: that they are too often "taken as read."

We are all familiar with contract notes or forms containing numerous terms and conditions comprising a contract which we do not trouble to read, particularly such as are printed in small type in a long document, *e.g.*, in an insurance policy—even though it is vitally important to us to be fully acquainted with all the elements of the contract we are making. We bend readily to put our signature to the document and hope for the best.

Frequently, indeed, business conditions render it practically impossible to study every document in detail. More especially is this the case where the document involves technicalities outside our particular sphere of activity. Thus, to one engaged in the electrical industry the terms of a standardised form of contract used in that industry, or a particular section of it, may be thoroughly familiar; a party contracting for electrical work, on the other hand, may know nothing about its technical aspects, and so he tends not to trouble himself with the technical details of the contract. Similarly, a party having premises constructed for him does not normally trouble to understand all the details of the building contract.

The arguments for and against this important reform in arbitration law may be crystallised by a consideration of some of the leading cases centring around this question of possible bias in the arbitrator.

In *Nuttall v. Manchester Corporation* (1892) the city surveyor was in charge of works which formed the subject matter of a contract with the plaintiff. The contract included a clause whereby the surveyor was to act as referee on all disputes. The contractor (the plaintiff) claimed for certain extras, and in order to decide whether or not he was entitled to such extras it was necessary to decide whether the instructions of the surveyor had or had not been correct. The Court took the view that, in the circumstances, the contractor ought to be free to proceed with his claim at law instead of being bound to submit to arbitration, since the essence of the dispute really involved the surveyor's own professional and technical skill. This decision of the Court, it will be seen, was based not upon concealment by the Corporation but upon the fact that the particular dispute which had arisen rendered their own surveyor unsuitable to act as judge. All sorts of other disputes might conceivably have arisen under the contract as to which the surveyor might have been permitted by the Court to carry out the arbitration.

Each case is to be considered upon its particular facts and

Revising a Tariff. By C. R. Cooper, B.Sc., A.M.I.E.E.

A rapid method of forecasting the results

A LABORIOUS analysis of consumers' accounts and involved calculations are usually necessary in order to find the general effects of any alteration in the steps of a sliding-scale tariff. The questions to be answered are:—What will be the reduction in revenue and how many consumers will receive a reduction and be stimulated to further use?

The electricity used by any particular type of consumer may be analysed in several ways, but in order fully to accomplish its purpose the analysis must provide the following information:—

(i) Total kWh used by the type of consumer under consideration.
(ii) Total kWh used on each step of the tariff.
(iii) Number of consumers on each step.
(iv) Effect on the revenue of an alteration in the steps.
(v) Number of consumers who will be affected by any alteration in the steps.

Above all, the analysis must present the information in a clear form and be capable of easy interpretation. A method which has been used with considerable success is for the consumers to be grouped according to predetermined ranges of consumption; in this way their number at any position on the sliding scale may be determined. This method can be amplified by plotting curves showing the variation of kWh per consumer on a base of total consumers. These curves serve two purposes: they enable the effect of an alteration in tariff to be visualised and hence freely discussed, and they form the basis of graphical methods of rapidly evaluating the results of alterations.

A typical curve drawn up on this basis may be constructed as follows:—Consider the application of an imaginary sliding-scale domestic tariff in which the primary and secondary steps of the sliding scales vary with the size of house and with the particular quarter of the year. In order to make a detailed study of the application of the tariff four curves would be necessary for each size of house, namely, one for each quarter, but it is usually sufficient for all practical purposes to have an average curve for the two winter quarters and another for the two summer quarters.

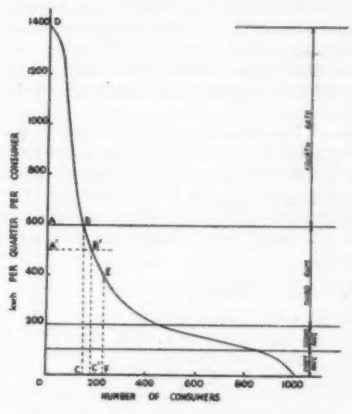
How to Proceed

The number of consumers taking various amounts of energy will be taken out in predetermined steps for each size of house, the steps becoming larger as the consumption increases. The actual steps which should be taken can only be decided after a preliminary survey of the trend of the consumption has been made on the lines indicated in the abbreviated table.

Sliding scale: 100 kWh primary rate, 100 kWh second rate and 400 kWh third rate.

kWh. per winter quarter.	No. of consumers in step.	Cumulative total of consumers.
0–10	5	1,000
11–20	5	995
21–40	20	990
201–250	85	440
251–300	55	355
301–400	70	300
401–500	50	230
501–600	40	180
601–700	10	140
701–800	20	130
801–900	10	110
901–1,000	10	100
1,001–1,100	10	90
1,101–1,200	10	80
1,201–1,300	15	70
1,301–1,400	55	55

In constructing the curve the cumulative total of consumers is plotted against the lower consumption of the corresponding step. In the instance given no consumers take more than 1,400 kWh per quarter, but fifty-five use between 1,301 and 1,400 kWh. The first point to be plotted is, therefore, 1,400, 0 and the second 1,301, 55. Succeeding points are plotted in a similar manner.



A typical curve

When the curve is completed the tariff quota lines may be drawn in their appropriate positions. The area under the curve represents total kWh per quarter, since it is the integral of the curve drawn and is, therefore kWh per quarter per consumer multiplied by the number of consumers.

As an example of the use of the curve let us suppose it is required to know the effect of reducing the third step of the tariff from 400 to 300 kWh per quarter; that is, all consumptions over 500 kWh per quarter will be charged at the fourth rate instead of all over 600 as at present. The total number of kWh affected will be represented by the area of the trapezium ABB'A' and will be AB+A'B'/2× number of kWh drop in step=140+180/2×100=16,000 kWh per quarter. The reduction in revenue will be this number of kWh multiplied by the difference between the fourth and third rates.

The number of consumers who benefit will be shown at C', that is, 180, and the additional number of consumers who will now come on to the fourth rate will be represented at C C', that is, 180-140=40.

An example of the use of the curve for general information purposes is as follows. It is required to know how many consumers use 400 kWh per annum or more, the total units used by them and the total revenue received from them. The total number of consumers reaching the 400 kWh per annum mark is shown at the point F and is 230. The total kWh used by them is represented by the area DEFO. This area may be taken out by any of the ordinary methods used for calculating the areas of irregular plane figures or by using a planimeter. The latter is much the better method if a large number of curves is being analysed, and once the constant for the instrument has been found, the kWh can be very rapidly calculated.

The revenue received is arrived at by sub-dividing the number of kWh in (b) into the various rates. Those at the primary rate under the primary quota line, *i.e.*, 100×230=23,000; similarly the kWh payable at the second rate are 100×230=23,000. The kWh at the third and fourth rates may be found by calculating the areas of the two irregular figures below and above the quota line AB, respectively, which make up the remainder of the figure DEFO. It only remains to multiply the number of kWh by the respective average prices.

Advantages of the System

This form of analysis may be applied to any type of sliding-scale tariff either for power or domestic purposes, and it vividly portrays data which would otherwise appear only as a complicated mass of tabulated figures. It illustrates not only the money values involved in any proposed alteration of tariff, but also the probable "popularity" of the changes by indicating the number of consumers who will benefit by the alteration under consideration.

Where a full analysis requires investigation of a very large number of consumers, representative batches may be examined, these being adjusted to give an approximate estimate for the total consumers. This adjustment would involve multiplying the number of consumers in each step of the analysis table by a constant equal to the total number of consumers divided by the number of consumers analysed.

The curves would then be constructed as already outlined above and should give results approximating closely to the actual figures, the degree of error being found by comparing the total kWh as calculated from the curves with the known total kWh sold.

The New Arbitration Law. *(Concluded from the preceding page).*

merits; the mere fact that the referee is an employé of one of the parties is insufficient of itself to disqualify him from acting as arbitrator.—*Eckersley v. Mersey Docks and Harbour Board* (1894). There must be a reasonable suspicion that he will be likely to act with partiality.—*Ives and Barker v. Willans* (1894).

In Kimberley v. Dick (1871) the architect employed by a building owner had given him an undertaking that the total cost of the works should not exceed a stated sum in any event. The architect was nominated as arbitrator by the contract. The building contractor when he entered into the contract which included this arbitration clause did not know of this undertaking given by the architect to the other party. Accordingly, when he discovered the fact the Court released him from the obligation to refer to the architect in arbitration proceedings claims which he desired to put forward for extras, since the architect could not decide in his favour if he was to fulfil that undertaking by which he had bound himself.

Prepayment Meters. By Oliver Howarth, M.I.E.E., M.Amer.I.E.E.

Their application to two-part tariffs

THE problem of adapting the prepayment meter to the two-part tariff has agitated the minds of engineers for several years past, for the steadily growing use of electricity for other household purposes than lighting has crystallised the two-part tariff as the most convenient method of charge which can be applied without modification to both the 50- and the 5,000-kWh per annum consumer. Until the advent of time-control of frequency and low-cost, self-starting synchronous motors it was not commercially practicable to construct a prepayment meter which would simultaneously charge for time and for kWh.

Various modifications of the standard type of flat-rate prepayment meter have been tried to meet the higher consumption of the modern electrified dwellings, but the popularity of the straightforward two-part tariff meter, which has been available for about eighteen months with synchronous-motor drive, indicates that most of the ingenious alternatives previously devised will be superseded.

A Useful Device

Manufacturers of two-part tariff prepayment meters are to be congratulated upon the ingenuity they have displayed in adding a device which makes the alteration of the weekly charge collected a simple matter. A screwdriver or key is inserted through a hole in the cover and turned until the pointer indicates the desired weekly charge. This device facilitates handling, as the meters can be set to the appropriate fixed charge when issued or when installed. It also enables hire and hire-purchase charges to be collected by the meter and, should there be any change in these, the collector can make the necessary alteration during his next visit. Thus the meter will automatically collect from the customer all the money he may owe to the supply undertaking, and the necessity for sending out bills and collecting accounts is consequently avoided.

It is inevitable that some supply undertakings will desire to seal up the device for altering the weekly charge, while others will prefer that removal of the till by the collector gives him access to the device. One manufacturer of these meters has arranged his meter so that the supply undertaking can use either of these methods.

This type of meter is not without disadvantages. One is that when fitted in a bakelite case it is still necessary to earth the mechanism to ensure safety if a screwdriver or metal key is inserted to alter the weekly charge. Another, inherent in the two-part tariff, is that it runs the customer into debt although he makes no use of electricity, and he may find himself in the position of being unable or unwilling to insert sufficient cash to restore the supply. This is not an insurmountable difficulty.

When an ordinary quarterly consumer fails to pay his supply is cut off; he must pay his debt and, perhaps, a reconnection fee before he is allowed to become a consumer again. In the meantime he may have ceased being a customer for a few months and although he was previously, and is subsequently, a two-part tariff customer he pays no weekly or quarterly charge for the period that he is cut off.

The two-part tariff prepayment meter automatically cuts off the supply immediately the prepaid money is exhausted; that is, the customer is not allowed any credit. If the meter is arranged to cease debiting at a certain value, for instance 5s., the customer will have to insert more than 5s. to restore his supply. If, therefore, the 5s. is regarded as a reconnection fee, the relations between the customer and the undertaking are similar no matter whether he be a credit or prepayment customer.

In the case of the credit customer the debt has to be collected, and one or more employés must visit the house to cut off and reconnect the supply, whereas the two-part tariff prepayment meter does not allow any debt to accumulate, but cuts off the supply and automatically restores it on the insertion of a predetermined reconnection fee.

The Trend of Design

The next important development to be incorporated in the prepayment meter will almost certainly be in the direction of modifying the multi-coin mechanism. The examples at present available are not sufficiently simple in operation to encourage supply undertakings to make extensive use of them, but there is promise of multi-coin meters being available which may be operated in exactly the same manner as the single-coin meters. That is, the coin is inserted and the handle turned.

The mechanism of the meter, which will deal with coins of three denominations, will sort the coins and give the appropriate value to each. This is a marked improvement likely to be attractive to supply undertakings. The usual three denominations are shillings, sixpences, and pennies, but, as the amount of money spent by householders on electrical service grows, it is probable that provision for half-crowns, shillings, and sixpences will be more useful.

A Diesel-electric Paddle Vessel

THE new Diesel-electric paddle vessel *Talisman* has been built by Messrs. A. & J. Inglis, Ltd., Glasgow, to the order of the London & North-Eastern Railway Co. for its passenger service on the Firth of Clyde. The machinery, except the paddle wheels, was made and fitted by the English Electric Co., Ltd.

The vessel's principal dimensions are length 224 ft., breadth 27.5 ft., gross tonnage 544, and speed 17 knots. The ship is built of steel and is subdivided by watertight bulkheads into eight compartments. Accommodation is provided for 1,259 passengers on three decks. All cooking is done electrically.

Propulsion is by a double-armature motor directly fitted on the paddle shaft. Each of 400-b.h.p. 600-r.p.m. eight-cylinder Diesel engines (10 in. diam. by 12 in. stroke) drives main 284-kW and a 36-kW auxiliary generators. Exhaust silencers and "Vortex" spark arresters are fitted in the funnel. The current generated also supplies electricity for lighting the vessel and for working pumping machinery, air compressors, capstans and windlass, steering gear, ventilating fans, heating appliances and galley ovens, cookers, &c.

Manœuvring of the paddle motor is carried out by the captain directly from the navigating bridge by means of a bridge control system. This utilises the normal ship's telegraph pedestals, which cause the paddle motor to rotate automatically in the required direction without attention from the engineer.

A point of interest is that the fore and aft movement usually noticeable in light paddle vessels driven by steam reciprocating engines is entirely absent. The centrifugal pumps in the engine-room are of Drysdale make. The steering gear is controlled by Brown's "Telemotor," and the engine is of Reid's electrical type, as are also the capstans and the windlass. The ventilating fans, trunks and louvres were supplied by the Thermotank Co., and the oil purifier by Laval.

A 20-kW standby set, consisting of a four-cylinder National heavy-oil engine driving a generator can be used for ship and hotel purposes when the main engines are shut down. There is also an air-cooled, single-cylinder emergency Diesel lighting set by the same makers fitted on the main deck for lighting a few lamps throughout the vessel. Refuelling is by means of a flexible pipe which can be directly coupled to a rail tank car brought alongside the vessel while at a quay.

The new L.N.E.R. vessel "Talisman"

Setting Out Overhead Lines. By "Beta"

Suggestions for minimising objections to their use

A LITTLE care in setting out overhead lines, assuming these to be of good design and construction, will minimise the objections to their use. With a view to unobtrusiveness and the avoidance of lightning troubles, lines should, as far as possible, be run on the lowest available ground. Unfortunately, this generally happens to be the best agricultural land, and the resulting line is something of a compromise between the requirements of the farmers, the local authorities and the supply undertaking. As most of the load in hilly country is situated on the lower ground, the line will have to be put there, but assistance can be obtained from the large number of fences which usually abound in this class of land.

The normal span being known, it might appear ideal to site supports at this distance apart and to supply extensions to obtain the requisite clearances, but this is impracticable; indeed, it is preferable to settle the normal span after pole or tower positions have been obtained. My own method is to mark the ideal point-to-point line on 6-in. Ordnance maps, taking into account fences, streams, woods, contours, and the like, and to modify this, in the first instance, by running over the route by car. Access for construction, inspection and maintenance can then be gauged and the route modified to run near possible future load and to avoid obstructions not shown on the maps, such as new woods, belts of trees, and new housing estates.

Co-operation Helps

An interview with the local Post Office engineer at this point will probably save endless trouble in the future, as he will be in a position to say, without prejudice, which lines his department would not wish to put underground. Quantity is no guide, and far more trouble can be caused by a single-pair junction than by a twenty-pair loop, to all appearances by far the more important. Chats with the officials of the local authorities and agents or factors of large estates will also prove helpful, as their knowledge of local conditions must be greater than one's own.

In anything like flat country, one can, by walking along the route, pick actual pole positions, the sizes only being settled by survey, which can be left until after the various consents have been obtained. This is a great economy, as a detailed survey can be very expensive, particularly if many deviations are necessary. This patrol is by far the most important part of the work, and whilst on site it is advisable to pick out alternative lines in order to avoid a second visit to site if wayleaves prove difficult.

As the work proceeds it will often be found that slight alterations to the line already laid out will make it possible, for instance, to avoid felling a large tree used as shelter by cattle or to site a pole in a pasture instead of in the middle of an arable field.

Poles should be placed against fences as far as possible and on the side remote from a ditch. This avoids the danger of blocking up the latter and may also save trouble over disputed ownership—a particularly important point when it is proposed to run wide-base lattice towers along a fence line.

Some local authorities do not care for supports in roadside fences in view of possible road-widening operations at a later date, and the adjacent owner is generally averse from their being set back the suggested distance. This difficulty can generally be overcome by promising to move the pole or tower as and when the fence is put back, agreeing the limit of movement there and then, and installing a support of sufficient height to suit all positions within this limit. To simplify the movement it is advisable to avoid making the roadside position an angle one. Poles on the insides of bends are sometimes objected to as obscuring the view for traffic; on the outside, however, they are more liable to damage from vehicles. The second position is preferable if there is a possibility of a low-voltage supply being taken from it along the road at a later date, as stays on the latter run will then fall away from the road and not into the verge.

Uniform Spans

On open moorland inquiry should be made in order to avoid siting a line across a game drive. Bird warnings should be fitted if necessary. It is an advantage for the adjacent spans to be as nearly the same length as possible, not only for appearance, but also to avoid undue strain on the binds due to temperature variations. My practice, where possible, is to keep them within 10 per cent. of one another, and with a little care this can usually be achieved. When a very short or very long span is necessary, within the limits of standard construction, it is a great advantage if the adjacent spans can be graded up or down to the abnormal one.

The siting of supports on a crest should be avoided. They have a detached appearance and should be replaced by one on each side with, if necessary, a short span in between and extensions as well. In addition to improving the appearance of the line, the dead weight of the spans on each side is more effectively arranged. As the exposed crest span is short there will be little danger of the conductors therein swinging into contact with each other. Where there is a choice of position an extension should always be installed at the lower one, as a much more level appearance is obtained and the dead weight is more evenly distributed.

I have no compunction in using spans considerably longer than normal. Each case, however, should be considered on its merits and, if necessary, when poles are used as supports, diameters should be increased, heavier insulator pins fitted, and, possibly, longer cross-arms. In the interests of construction and maintenance special structures should be avoided, an extra-standard pole being far preferable from every point of view.

The installation of make-off poles at uplift positions is to be deprecated; the extra cost of such a pole is far better spent in providing, where possible, a taller pin or suspension type of support. It should be borne in mind that the shortest pole that will just not have uplift on it according to profile and templet would with some conductors be very near the limit even at normal temperatures, and something extra should be allowed in such cases.

Stays are the cause of even more dispute than supports and correspondingly greater care should be taken over their position. Farmers appear to prefer the vertical arrangement of a group of stays in preference to having them spread sideways; with the former arrangement a simple fence taking up little area can be provided as a warning to stock. Whether this vertical arrangement has any technical advantage or not depends upon the type of pole-top construction, but at terminal positions there is a lack of lateral stability that the side-spread arrangement provides. One should always try to site the pole with regard to the stay and most occupiers will prefer to have a pole a little out from a fence, if it can be promised that the stay will drop alongside it.

The Use of Head Stays

There is a divergence of opinion as to the need to provide make-off poles with head stays at intervals along a line. It would appear that for lines below, say .04 sq. in. cross section, the value of head stays is questionable, as a broken conductor or conductors on pin insulators with good binds will not slip through or pull over more than five or six poles. With heavier conductors and steel lines far more poles may be affected and head stays might well prove their worth. It is, therefore, not so much a question of increasing their distance apart as deciding whether they should be fitted at all, where practice advocates an interval of about a mile. In arable country there is often the greatest difficulty in finding suitable positions and the matter is even more complicated if there is also a side stay to contend with. Another reason for avoiding slight angles at head-stayed positions is that it is very difficult to keep the angle stay tight. If slack it may become dangerous to stock which will not only pull the pole out of plumb by rubbing on it but also possibly work the cattle guard loose and tear themselves on the point. At such positions I have tried doing away with the side stay and set the head stays slightly out of line to take the deviation pull. This has not proved too satisfactory and the best solution appears to be to erect a small fence against the stay.

An Eye on the Future

Possible future tee-off positions should be selected so that the spur may run along a fence or dyke and any stays at the tee-off pole may be similarly situated. The same remarks apply to pole mounting sub-stations feeding an overhead low-voltage network with even greater force owing to the shorter spans used.

Switching structures and sub-stations should be selected with a view to easy access. They should be kept out of arable fields, and also, where possible, away from public roads so as to avoid the duplication of insulators and the thrusting forward of a target for stones.

At short underground crossings it is an advantage for the cable to run in a straight line from pole foot to pole foot

with a sweep at the foot of each pole to provide slack in case of breakdown. This method allows of easy location of the cable in case of trouble without reference to any records. Across the surface of roads it is good practice to cut the trench at a slight angle to the normal as the wheels of vehicles will then hit the resulting irregularity one by one and not in pairs. Some contend that the reinstated surface will hold better and not "creep" down the camber under the action of heavy traffic.

Where mid-span conductor joints are not permitted, make-off positions should be selected with a view to easy access for heavy conductor drums and stringing tackle.

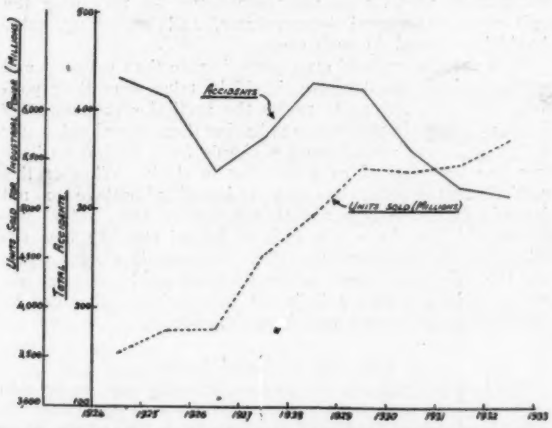
Angle positions should be avoided where there is a possibility of rock being encountered in the stay hole. The greater one's experience, however, the less one cares to be definite as to the possibility of rock being met with near enough to the surface and in quantities sufficient to prove troublesome and expensive. It appears where one would least expect it and where provision is made for it there is often no trace. Even local opinion is no guide, as little or no excavation is done by the natives to the depths commonly met with in overhead line work. Large quantities of water, running sand, peat and the like are far better known, and construction during dry spells at points where this class of excavation obtains will often save a considerable amount in extras.

If these points are borne in mind in setting out overhead lines, their appearance will be greatly enhanced, future extensions will be easier to deal with, a saving in cost may be obtained, and, last, but not least, the wayleave position should be considerably more satisfactory.

Electricity in Factories

THE Annual Report of the Chief Inspector of Factories and Workshops (Mr. D. R. Wilson) for 1934 (Stationery Office, 2s.) covers over 284,000 premises, of which about 163,000 are factories and 83,000 workshops, representing an increase of 2,737 factories and a decrease of 3,741 workshops compared with the previous year, the tendency being to increase the size rather than the number of manufacturing units.

Out of a total of 136,858 accidents to individuals (785 fatal), 380 were due to electricity (31 fatal); the latter included 54 in generating stations (12 fatal). In the electrical engineering industry as a whole there were 4,341 accidents (eight fatal),



Curves showing the reduction in the number of electrical accidents with the increased use of electricity in industry

and 769 in generating stations (19 fatal). Only 44 (one fatal) of the accidents that occurred in electrical engineering and 54 (12 fatal) at generating stations were due to electricity. In accumulator works there has been an appreciable reduction in notifiable cases of poisoning during the past four years, the number having fallen from 36 to 12, none of them fatal. There were over 1,100 accidents (38 fatal) due to transmission machinery, a large proportion of which occurred at shafting and driving belts and ropes.

Mr. Wilson comments upon the continuance of development of industry in the South and states that more than 500,000 persons have been attracted during the past seven years to new industries in and around London. Elsewhere also there were indications of returning trade. The electrical industry in all its branches did well; the iron and steel, shipbuilding and marine engineering industries all showed encouraging signs of a revival of trade. There is a tendency to convert redundant cotton mills and weaving sheds to other purposes, which include the manufacture of electrical fittings. Arc welding is largely replacing riveting and a factory was opened in Scotland for the manufacture of electrodes.

The light-sensitive cell has been successfully used in a tube works for automatically controlling the discharge of hot tubes from the rollers to the cooling stacks. This operation was formerly performed by boys and accidents occurred due to bad timing.

In the important section devoted to lighting reference is made to the inefficient systems still prevalent. Foundries, clothing establishments, and the steel-tool, cutlery and silversmith trades and potteries are generally poor. This has led not only to eyestrain but also to serious accidents. The improvements that have been made are often least where most needed.

On the other hand, considerable advance has been made in lighting intricate processes in artificial silk and hosiery works; special local points adjustable for height are used on hosiery knitting frames, whilst for "linking" and "running-on" the machines are tilted to obviate glare from the polished surfaces of the needles. Absence of shadow and glare is secured in a vitreous enamelling shop by the use of 350-W sprayed lamps in bowls without reflectors, the walls, floors and ceiling being dead white.

Floodlighting has largely eliminated local lighting in an aircraft works and gives a minimum of illumination of 18 ft.-candles at floor level; photometric readings are frequently taken and all renewals and cleanings of fittings are logged. "Daylight" lamps are becoming increasingly popular.

In large foundries good results have been obtained with the new type of electric-discharge lamps; the 430-W lamps at 26 ft. above ground level illuminated an average area of 625 sq. ft. Outline and detail in the dark sand are said to be much more clearly defined than by ordinary methods.

In a section on "Noise in Industry" reference is made to an electrical sub-station in a densely populated area in which the annoyance caused by the continual hum from the rotary convertors was reduced by introducing an air space between the inner and outer walls.

The report records the death in January of Mr. K. Preston who had been an Electrical Inspector of Factories since 1927 having previously been chief electrical engineer to the North Western Railway, India.

The Harrogate—Ripon Merger

AT a luncheon following the ceremony of transferring the Ripon electricity undertaking to Harrogate Corporation (an account of which appeared in our last issue), at which the Mayor of Harrogate (Mr. R. C. Hamilton) presided, Sir John Brooke (vice-chairman, Electricity Commission) proposed the toast, "Greater Success to the Development of Electricity in the Ripon and Harrogate Areas." He said that the transference was a sound business deal, and many local authority undertakings in various parts of the country would do well to follow the Ripon-Harrogate example. The amalgamation, and the service which both Ripon and Harrogate had rendered to their rural neighbours, seemed to him to show that the North must be a little farther ahead than the South. The amalgamation gave special benefits, because in electrical work very high technical skill was required, which was, and should be, expensive. In this respect there were economic advantages, and there was also a great technical advantage in enlarging an area, because the layout of the transmission system and the development of the distribution system were accomplished more easily and cheaply under a comprehensive scheme of this kind.

Referring to the progress in electrical affairs made by Harrogate in recent years, Sir John said he had little doubt that the Ripon consumers would share the same benefits, and he urged them to take full advantage of the new cheap facilities offered. More than a business deal had been completed. Another piece of the national plan had been set in place.

Councillor F. W. Hargrave (chairman, Ripon Electricity Committee) thanked Sir John Brooke for his help to the Ripon undertaking over the past few years, and pointed out that they had not had a single refusal from the Electricity Commissioners, and the union with Harrogate was largely due to the Commission. Councillor C. E. Morris (chairman, Harrogate Electricity Committee) also paid tribute to those who carried out the negotiations. Others present included Messrs. S. E. Fedden (C.E.B.), N. McLean (borough electrical engineer, Harrogate), and P. H. Molyneux (city electrical engineer, Ripon). Sir John Brooke formally opened the new electricity showrooms after the ceremony with a golden key.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

A Works Explosion

Our name has been associated with the recent "explosion" of a "main switch" because members of our erection staff happened to be engaged in the sub-station concerned at the time of the accident.

In fairness to us, will you kindly allow us to draw attention to the following extract from one of the announcements in the Press: "Their [Reyrolle's employés] activities had no connection with the explosion," and also to announce that the "main switch" referred to was not of our manufacture or supply. A. REYROLLE & CO., LTD.

Hebburn-on-Tyne, *July 4th.*

Alkaline Batteries in France

With reference to the letter in your July 5th issue from Monsieur A. Vintenon, of the Société des Accumulateurs Fixes et de Traction, I might reiterate that in the fourth paragraph of my article I was referring to automobiles, *i.e.*, private motor cars, and not to the small host of other types mentioned in his letter. It seems to me, however, that 12,000 batteries is scarcely a large number to divide among the ten types of road vehicles enumerated by Monsieur Vintenon, over a period of two years, considering the large number of private cars that are put on the road each year.

I cannot agree that I have cast any reflection upon the alkaline battery industry as a whole. Indeed, prominence was given to alkaline cells in the article, in view of their importance in *this* country. Moreover, the question of whether one type or the other be used is, as often as not, decided by domestic policy and not after technical pros and cons have been duly assessed. Each type has its advantages and, as indicated in the article, quite often little remains to choose between them. Users often change from one type to the other.

To the remainder of the letter I make no reply, as points are raised that are not mentioned in my article.

Bromley, Kent, *July 7th.* R. WHEATLEY MINTER.

Electrical Terminology

The interesting contribution by Mr. Taunton, in this week's REVIEW, freshened with a gentle sarcasm, brings before us the need for more lucid expression of thought by the use of fewer words. Whilst on the job, the word "amp" is familiar to all, yet in the specification which is to be read by individuals without electrical knowledge the use of the word ampère becomes imperative.

Also, with the modern general carelessness in expression, to obtain a satisfactory medium of result it is necessary to go to the other extreme in detailed expression. The divergence to which he refers then arises. Regulations become necessary owing to the carelessness of the individual; the conscientious worker always reaches a standard of work above that stipulated by regulations. BERNARD A. CRONIN.

Cardiff, *July 6th.*

Engineers and Economics

Mr. F. R. Jervis in his criticism of the I.E.E. examination paper "Engineering Organisation, Management and Economics" in your issue of July 5th has fallen into the error common to those who see in that unfortunate word "economics" the alpha and omega of what an engineer should know about business. The word should, as he says, be deleted from the heading because it lends itself to misinterpretation. The "Mechanicals" have the same syllabus under the title "Fundamentals of Industrial Administration"—a name which conveys more truly exactly what the subject means.

The syllabus is not intended to teach economics or management but has been drawn up, after many years of experience and deliberation by those competent to decide, for the purpose of giving the student an informed and comprehensive view of the industrial field—a knowledge which it is considered should be possessed by responsible engineers.

With some experience in teaching to the syllabus I will agree with Mr. Jervis that its scope is too wide, but one has to take notice of the fact that the whole is intended as a background, or the first stage to a more detailed study of administration by which it is hoped that the technician may, with suitable practical executive experience, come in time to the management of his own industry. Such subjects as the "Growth of Industry," the "Origin of Commerce" and "International Trade" to which Mr. Jervis takes exception are surely worthy of consideration if an informed mind is to result from the study of the syllabus.

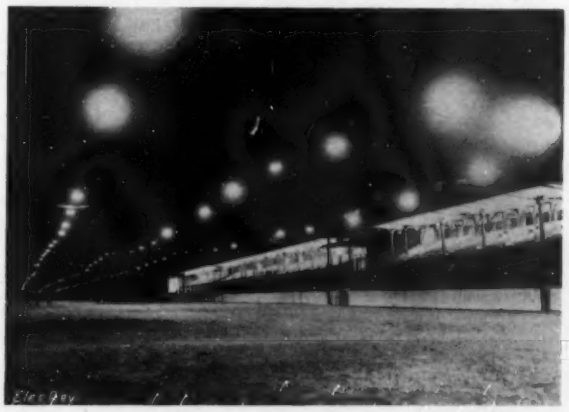
Not all engineers have an inclination for management, and it is to those that the syllabus should appeal as conveying sufficient information concerning things commercial and industrial. Others who wish to go further will find the particular value of the syllabus as they proceed to a more detailed study of the functions of management.

It is not too much to hope that the great majority of student engineers will not only welcome the inclusion of the paper in the I.E.E. examination but will feel that the six months required to cover it is time well spent. After all, an engineer must surely be a better engineer as the result of knowing a little more about how industry is run, even though he take no part in its administration. H. N. MUNRO.

London, S.W.1, *July 5th.*

The Boiling Plate Again

Mr. Bailey's article entitled "Boiling Plate Characteristics" in your issue of June 28th makes out a good *theoretical* case for the solid boiling plate. His tests on solid boiling plates were no doubt made on new plates and vessels, which would have their surfaces in contact reasonably flat. However, although when new the two surfaces may be reasonably flat, after quite a short period of everyday ordinary use (and abuse)



Paris, the "City of Light," has made a special effort for the current "Grand Season." Our picture shows the Longchamp racecourse and stands brilliantly illuminated for the occasion

neither surface will be even approximately flat and probably not even clean, and therefore such tests are practically valueless as a guide to the speed and efficiency of solid plates in everyday household use.

If Mr. Bailey will make, and publish the results of, fair comparative tests on various types of solid and radiant plates (with the vessels actually used with them) that have all been in everyday service in an average household for, say, twelve months I am sure the results will be very different from those which he gives. There are a few users who will secure vessels with machined bottoms and will keep their boiling plates and vessels in as good a condition as they can, but the great majority will use any old vessel, as they do on a fire or on a gas ring. If every housewife who desires to use an electric cooker has to be equipped with a full outfit of special cooking vessels and educated to treat them properly, progress will be slow.

The speed and efficiency of all types of boiling plates can be improved by loading them so that normally their heating elements are running near the danger limit, but this very much reduces their reliability and increases repair costs. I quite agree with your statement that "the development of electric cooking has not, and will not, depend on thermal efficiency." The speed of heating a small quantity of, say, milk or soup, which Mr. Bailey admits is greatest with the radiant plates, is a most important point. Under present conditions a cooker fitted with one radiant plate, the other plates being of the solid type, is by far the best available combination.

With respect to your remarks re the psychological appeal of the "radiant" plate; our consumers who have once used a cooker with a "Superspeed" transformer operated plate, or have heard their neighbour's opinion of it, absolutely decline to accept a cooker without one; in fact many of them ask for a cooker with two or more such plates.

The reasons why solid plates are still in the majority are:—(1) They have been on the market for a much longer time. (2) The usual slowness in appreciating the advantages of a new

idea. (3) The first cost is lower. However, imitation is the sincerest form of flattery; five other cooker manufacturers have endeavoured to produce a satisfactory transformer-operated radiant boiling plate, and another very large manufacturer has endeavoured to secure a licence to use my invention.

Taunton, *July 5th.* ARCH. J. HOWARD.

Immersion Water Heaters

I was very much interested in the article on this subject by Mr. Chisholm in your issue of July 5th, as it shows that some branches of the electrical supply industry are very much alive to the possibilities of the domestic load. It is a pity, however, that there is not more propaganda in the shape of attractive advertising similar to that of the competing industry. Electricity can be a boon to the small householder, but he is usually scared of the cost. Water heating in the summer is an example, but the average man knows very little about it.

Mr. Chisholm naturally advises continuous loading with a lagged tank, but with the usual rates of supply this means, for losses alone, a weekly bill higher than that obtaining with the average boiler installation using solid fuel. It is this question of cost which makes the average householder sceptical about the use of electricity, and unless he is carefully instructed that it need not be expensive, he will not take the trouble to avail himself of the courteous invitations usually extended to him to visit the supply authorities' showrooms.

The usual procedure, therefore, is either to keep the boiler going during the summer months or else put up with the delay and mess of lighting up whenever a quantity of hot water is required. In addition, the busy woman with a family does not always appreciate the completely lagged tank, as there is little facility in the small modern house for airing damp clothes except in the hot-water cupboard.

As I was interested in this problem I installed, four years ago, at a cost of 45s. for material, an immersion heater with indicating lamp in the hot-water tank in my house. It has been an unqualified success, whilst the only lagging used consists of some strips of corrugated paper round the sides. This is removed in the winter. At ½d. a unit for electrical energy, I can get a hot bath for under 1d., whilst all the hot water required for a normal week's washing with a small machine is supplied for about 1½d.

In the eyes of some the time taken to heat the water—about half an hour in the summer—may appear to be a disadvantage, but I venture to suggest that the average housewife would prefer this to the trouble of lighting up a domestic boiler or kitchen range.

I have not studied the load factor economics of the scheme, but from the supply authorities' point of view it should be similar to electric cooking, and where a cooker is installed, a throw-over switch to prevent the heater from being used when cooking is in progress will limit the maximum demand. It may be as well to install a thermostat to prevent the water from boiling in case of forgetfulness, although with the indicating lamp very few people leave a cooker on.

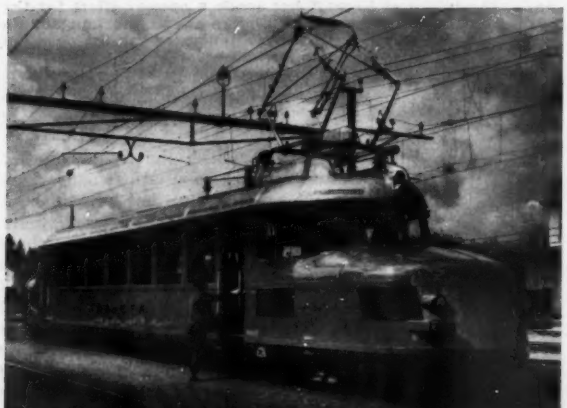
I estimate that I use 15-20 units a week for water heating with the immersion heater. This consumption is very small, but if it were multiplied by hundreds with the help of judicious publicity it would prove a useful addition to the summer load.

July 9th. C. A. K.

A New Swiss Electric Coach

IN order to meet the growing competition of road vehicles the authorities of the Swiss Federal Railways have for some time been engaged in considering ways and means of retaining the railway passenger traffic, and experiments to this end are now in progress, both increasing the number of trains per day and raising their speed.

Some time ago it was decided to make a trial, despite the higher cost, with more powerful motors, of specially light electric rail motor coaches. Two such vehicles have been recently built, one of which is now in daily service, covering a total distance of about 350 miles per day, while the other is held in reserve; they have been designed for use on sections on which there are but few curves and on which, combined with



The new light high-speed coach introduced by the Swiss Federal Railways

rapid acceleration, a maximum speed of 78 m.p.h. can be attained. The electric motors have a capacity of nearly 10 h.p. per ton of vehicle weight as against approximately 4 h.p. per ton in ordinary electric trains designed for speeds up to 62½ m.p.h.

The bodies of the vehicles, which have seating accommodation for seventy passengers, are of special construction, the framework being built up of light steel channels; they are of a modified streamline shape and mounted on two four-wheel bogies. One of their outstanding features is the mounting of the motors under a bonnet at one end of the vehicles and the compressed air plant and other operating gear under a similar bonnet at the other end. The seats, which are arranged transversely on each side of a central gangway, are of light tubular steel construction and upholstered in leather. Entrance and exit doors are provided at each end of the vehicles.

In cold weather the vehicles are heated by air electrically warmed by resistances located below the coaches and distributed by a fan along light metal conduits. The temperature is automatically regulated by thermostats adapted to switch the heating current on or off.

Over one of the four-wheel bogies are mounted two single-phase motors of a capacity of about 300 h.p. each driving through gearing one of the two axles. The motors have been designed to act as brakes; when doing so they run as generators, the power generated being absorbed by resistances mounted in the double roof of the coaches, in which openings are provided to ensure the necessary circulation of cold air. Electro-magnetic disc brakes are also provided on the second bogie. In addition, there are emergency brake shoes on the wheels of the non-motor bogie, these being actuated by compressed air, while, as a further safeguard, there is an emergency hand-operated brake acting on the wheels of both bogies.

The coach may be driven from either end, so avoiding the need for turntables at the railway stations. The driver, who is seated, has in front of him a wheel similar to the steering wheel of an automobile, which is used for controlling the speed, and the electric braking of the vehicle. As the wheel is turned clockwise the power of the motors, and the speed of the coach, is gradually increased; the turning of the wheel in the opposite direction brings the electric brakes into operation, and, when the last contacts are reached, the electro-magnetic brakes.

In addition, the driver has in front of him all the necessary measuring and speed instruments, the switches connected with the lighting, heating, compressor and other controls, and the levers for operating the compressed air brakes, the door opening and closing gear, &c. All the controls are so arranged that they are locked in neutral when the driver leaves the coach.

In order to keep down the weight of the vehicles to the minimum, the coaches are provided with only a single current collector. Moreover, the usual main switch has not been employed; instead, the power is switched in or cut off by raising or lowering the pantograph, a fuse being provided to prevent short-circuits. The coaches have a length of 70 ft. and weigh, without passengers, 32 metric tons. The mechanical parts and bodywork of the vehicles were constructed by the Swiss Locomotive and Engineering Works, of Winterthur, the motors and transformers by the Brown-Boveri Co. and the Oerlikon Co., and the control gear by the Ateliers de Sécheron, of Geneva.

The Swiss Federal Railway authorities, to whom we are indebted for the illustration and particulars of the new vehicles, point out that they are entirely experimental, and are intended solely for use during the hours of minimum traffic, and that it remains to be seen whether the results will justify the construction and running of further vehicles of the kind.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Panel Fires

Four new designs of inset and panel fires have been placed on the market by ROWLANDS ELECTRICAL ACCESSORIES, LTD., R.E.A.L. Works, Hockley Hill, Birmingham, 18. The "Estate" panel heater is fitted into a circular panel 23 in. in diameter and finished in cream, eau de Nil, powder blue or shell pink "Nacreal" enamel. "Realustre" (synthetic marble) provides a new material for the mounting of inset fires, and both panel and surround types have been introduced. The surface is fine, similar to ceramic, and the lustre can be retained by the occasional application of furniture cream. The chromium inset is of octagonal shape in the case of the surround and is recessed. The "Waldorf" tiled inset fire has been introduced for fitting into tiled surrounds.

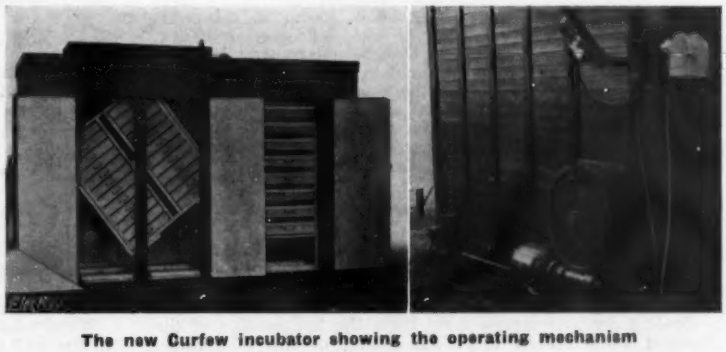
A new R.E.A.L. panel fire

An Electric Incubator

At recent agricultural shows there was exhibited a new electric incubator which will hold 4,000 eggs. It is made by CURFEW ELECTRIC HEATERS, Curfew Poultry Farm, Gogmore, Chertsey. Three thousand eggs can be accommodated in the turning chamber, so that a thousand can be put into the incubator every five or six days, while a thousand eggs are held in the hatching chamber. Both are lined with galvanised steel to conserve the moisture and facilitate cleaning, and air circulation is carried out by means of propellers, the fresh air being drawn in at the bottom and the used air expelled at the top.

The water trays in the bottom of the incubator are kept filled automatically by means of air-lock tanks, while the temperature of the chambers is dual controlled by means of mercury trip thermostats, and mercury-operated alarms are fitted and ring when the temperature is too high or too low, if the motor stops, or if the supply fails. The motors are of the a.c. induction type, silent in operation and running on ball bearings.

The automatic egg turner has a self-starting electric clock switch, which acts eight times every twenty-four hours; for stopping the motor when the eggs are tilted at right angles mercury trips are provided.



The new Curfew incubator showing the operating mechanism

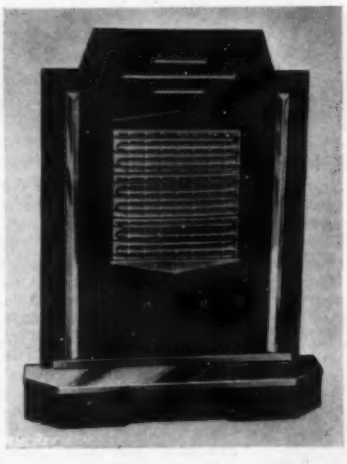
Walsall Conduits Fires

We were recently invited to view a range of electric fires made by MESSRS. WALSALL CONDUITS, LTD., Excelsior Works, West Bromwich. The facilities which the company has for casting and pressing have enabled it to introduce an exceptionally robust range of fires at a low price. In fact, the cheapest 1-kW sheet-metal fire remained perfectly rigid while a representative of the company stood on it.

Certain features are common to all models; for instance, the deflector which directs the rising heat at the back of the firebars forward and out, preventing discolouration of the top of the fire, particularly in the case of the art finishes. Ample room is allowed for expansion of the fire clay, to avoid cracking.

The company's London manager, Mr. Maisey, told us that he has come across cases where elements have been damaged and fuses blown (particularly in hotels) due to curling irons being placed on the protecting bars, and to overcome this fires are being supplied with a special form of wire mesh guard to protect the element. We were also shown the method of bolting the switch to the frame to ensure rigidity, and the two-piece bolted combined cord grip and bush, made of bakelite, by means of which we could raise the fire off the ground by the flex without any slipping taking place.

There are, in all, five types. Two, the "Tamworth" and "Stafford" models, are portable cast fires with loadings of from 1 to 3 kW in a large variety of colours, the former having a shaded matt finish and the latter glossy vitreous enamel.



The Walsall "Edinburgh" fire

The "Dudley" series are the lowest priced range and are made of pressed steel; in fact, the small model, which, as already stated, is of very rigid construction, weighs only 5 lb. The same fire with a cast-iron top for warming plates and dishes, is known as the "Ludlow." The finishes are art silver and art gold.

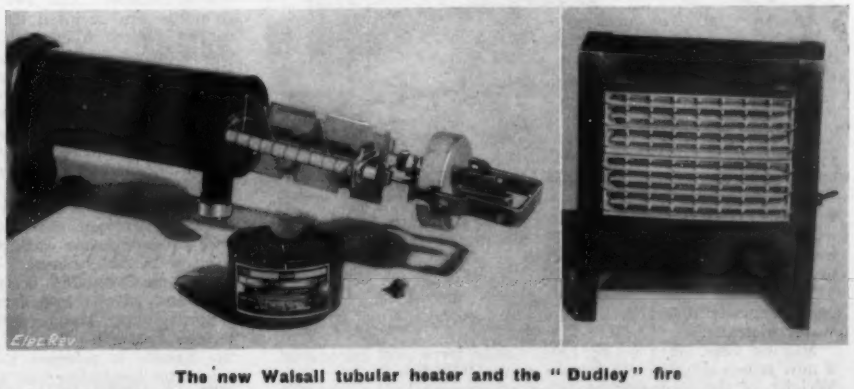
A type for meeting economically the vogue of "built-in" electric fires is the "Stirling," which has a strong cast-iron frame and a shaded art finish. Two switches are provided for the 2-kW elements. The last fire which we examined was a very striking ebony and chromium high quality fire designed for fitting in the ordinary coal grate.

The construction of the new tubular heater is shown clearly in the accompanying illustration. The entire heater can be easily removed from the case after undoing three screws. The element is supported by a strong mica strip which holds it in position, "U"-shaped grooves eliminating any danger of the element touching the outer case.

Provision is made, of course, for earthing the outside sheathing, and any length from 2 to 17 feet, loaded at 60 W per foot, is obtainable in single, 2, 3, or 4 tiers.

The "Bedalux" Vacuum Cleaner

On page 17 of our issue of July 5th we stated, with reference to the "Bedalux" vacuum cleaner, that "the cylindrical body of the machine is principally of bakelite, covered with green and gold rexine." The makers point out that the entire body is made of steel, covered with green and gold rexine, the only bakelite portion being the motor housing



The new Walsall tubular heater and the "Dudley" fire

at the end of the cleaner and the special swivelling portion inlet into the dust bag cover into which the flexible tube is fitted.

The "Rockit" kettle in the normal and "safety" positions

Recording Maximum Demand

A miniature a.c. instrument, with front connections, for recording maximum current demand over a period has been designed by MESSRS. ELLIOTT BROS. (LONDON), LTD., Century Works, Lewisham, S.E.13. The overall dimensions of the pressed steel case are 6.625 in. square by 4.75 in. deep, the length of scale being 2.3 in. and the chart speed one revolution in seven days with a dotting interval every fifteen minutes. The chart disc, 5.8 in. in diameter, is driven by a self-starting synchronous clock motor which is available for any usual voltage up to 440 at 50 cycles.

The maximum demand recording ammeter

The movement is of the d.c. moving-coil, permanent-magnet type operated by means of a Westinghouse metal rectifier (incorporated in the case) and giving a maximum scale deflection for 40 mA. The instrument is primarily intended for use in conjunction with Elliott split-core current transformers of either the clamp or scissors type. It may, however, be operated from any ordinary current transformer having a standard secondary current of 5 A, in which case an additional 5-A separating current-transformer can be provided fitted with terminals for connection to the ordinary transformer.

An Advance in Safety Kettles

The most interesting feature of the "Rockit" kettle (GEORGE GREEN & CO., Chapel Road, West Norwood, S.E.27) is the safety device which is operated not by a rise in the temperature of the element, but by the fall in the level of the water in the kettle.

The kettle is mounted on three substantial bakelite feet so positioned that when the water has boiled down to an unsafe level the kettle tilts and operates the safety trigger, allowing a spring-actuated plunger situated between the terminal pins to eject the connector, the element being thereby switched off before it is uncovered and before its temperature his risen. The kettle is made of aluminium or copper and chromium plating can be applied if required.

An Automatic Regulator

Arrangements have been made by MESSRS. HOPKINSON, LTD., Huddersfield, for the manufacture and sale in this country of a regulator developed by a Swedish engineer.

The Hopkinson-Carstedt regulator

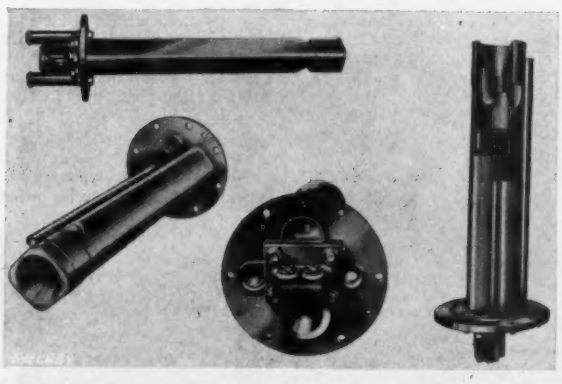
It is claimed that the sensitivity of this type of regulator is so great and the response so rapid that there is no over-running of the apparatus, an advantage which is of importance in many installations. In cases where there is considerable lag between the altering of the conditions and the final results a device is introduced which only allows the regulator to operate a small amount for each condition.

One of the main features of the Hopkinson-Carstedt regulator is its extreme simplicity in comparison with other types which require water or air for their operation. Only a supply of electricity is required for driving the reversible motor; this operates, through gearing and other mechanism, any valve or other apparatus to be controlled.

Preventing Scale in Water Heaters

IN the past attempts have been made to deal with scaling in water heaters by reducing the maximum cut-off of the thermostat to 140 deg. F.—160 deg. F.; this, however, results in inferior service to the consumer and is not effective.

Scaling deposits depend more upon the temperature of the heating surface than upon the setting of the thermostat. Most of the deposits take place upon the element sheath due to a thin film of water constantly rising up the sheath, boiling and depositing scale. Manufacturers have dealt with this

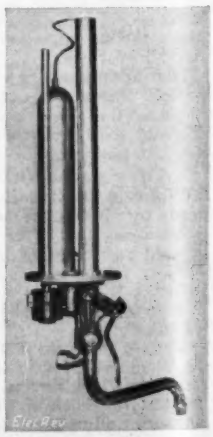


The "Scallak" immersion heater unit

to some extent by reducing the wattage density and, consequently, the temperature of the heating surface. It can be avoided by keeping the temperature of the heating surface at, or below, boiling point. This fact was appreciated many years ago by water heating engineers; hence the calorifier coils generally found in the hot water storage tanks in hard water districts.

MESSRS. GEO. BRAY & CO., LTD., Leeds, have now introduced a new anti-scaling heater known as the "Scallak." Mr. Alan Wright, of the company's London office, explained to us that this provides, in effect, a calorifier within the water heater. The elements are housed in a chamber which, when fixed to the storage tank, is filled with water, circulation between this still water and the water in the tank being prevented, although losses due to evaporation are made good automatically. Scale deposits in the heating chamber are limited to the hardness in the initial filling of water and that added to counterbalance evaporation, while the bulk of the water in the storage tank is heated indirectly through the walls of the heating chamber.

Thus, when a thermostat is fitted in the wall the still water, and consequently the heating surface, cannot reach a higher temperature than that set by the thermostat. The small amount of deposit which still adheres is of an entirely different nature from that usually found, being soft, friable and easily removed. Special designs are available both for pressure, non-pressure, and cistern type heaters.



The heating unit of the "Sadia" water heater, showing the thermostat in close contact with the heating chamber

The scaling trouble has been tackled somewhat similarly by AIDAS ELECTRIC, LTD., Sadia Works, Park Avenue, North Circular Road, London, N.W.10, in its free outlet water heaters. The two standard elements are enclosed in an outer copper jacket filled with a non-deteriorating heat conducting material, the indirect heat transmission resulting in a lower surface temperature and consequently a thinner and softer deposit. This material is a solid composition which liquifies when heated up.

The new "Sadia" heaters are also fitted with a special anti-drip device. This consists of a movable flow tube (*i.e.*, the outlet pipe delivering the hot water from the top of the container) which is actuated by a handle. By pulling on the handle the flow tube is lowered below the water level and on the last part of the movement a cam operates a spring tap. The cold water is then admitted to the container, displacing the hot water from the upper part. When the handle is released a spring raises the flow tube above the water level after first closing the spring tap.

The position of the thermostat plunger tube in metallic contact with the heating chamber should be noted. The outside appearance of the heater has not changed, and furthermore the new base is interchangeable with the present type. Both the 1½ and 3 gallon sizes have a swivel swan-neck 9 or 12 in. long and a variable flow restrictor.

Power Station Staff Salaries

IMPORTANT changes in the method of remunerating power station staffs are to be made as from August 1st as the result of a new agreement arrived at by the National Joint Board of Employers and Members of Staff (Electricity Supply Industry).

A new schedule has been substituted for that set up in April, 1923. The principal alterations are the introduction of three new classes of station—Class K, 150,001-200,000 kW, Class L, 200,001 to 250,000 kW, and Class M, over 250,000 kW; the granting of increments for length of service; and the stabilisation of salaries for three years at a higher level.

At present salaries are based upon the cost of living as at April, 1923 (125 per cent. above the July, 1914, level), adjustments being made in steps of five points according to the rise or fall in the official cost-of-living index figure. Under this arrangement salaries now stand at 16 points reduction; under the new agreement they will be based on 13 points of adjustment, representing an appreciable increase as will be seen from the accompanying table. In this abbreviated version of the schedule we give the salaries payable as from August 1st to the nearest £ and the three columns for each class of station are:—(a) For 2 years; (b) for 3rd and 4th years; and (c) after 4th year.

An employé who on April 1st, 1936, has completed two years' approved continuous service without increase of class or grade will be paid the salary under the heading "For 3rd and 4th years." On April 1st, 1938, if an employé's class or grade has not been altered and he has completed four years' approved continuous service he will be given the further increment shown under the heading "After 4th year." Any increases above the schedule rates voluntarily conceded by the employers will be merged in the increments when they become due and this also applies to increases given in anticipation of the provision of classes higher than "J" prior to August, 1938.

If an undertaking is reduced to a lower classification an employé will receive the salary corresponding to his service qualification in the new classification. If the classification of a station is higher than Class "J" the higher classification will, as regards employés whose duties are not performed within the station, apply only to those employés whose duties and responsibilities have been increased.

The variations, additions and amendments provided for in the original agreement are to remain in force. For instance, employés in the London area are entitled to an addition of 5 per cent. to the schedule rates, and in any district where conditions justify lower remuneration a deduction of 5 per cent. can be made by mutual agreement.

THE NEW SCHEDULE OF SALARIES

(Capacity or maximum demand in kW.)

Grade*		1	2	3	4	5	6	7	8	8a	8b	9	9a	10	10a	10b	10c	11	11a	11b
		£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£	£
Class A 1,000–2,000	a	476	412	370	316	298	269	242	242	225	208	—	—	—	—	—	—	—	—	—
	b	487	421	378	327	306	280	251	242	225	208	—	—	—	—	—	—	—	—	—
	c	499	432	388	339	314	289	260	242	225	208	—	—	—	—	—	—	—	—	—
Class B 2,001–4,000	a	510	441	396	350	323	300	269	242	225	208	—	—	—	—	—	—	—	—	—
	b	526	456	410	358	333	306	280	251	232	215	—	—	—	—	—	—	—	—	—
	c	543	470	424	367	344	314	289	260	239	221	—	—	—	—	—	—	—	—	—
Class C 4,001–6,000	a	559	484	437	374	354	321	300	269	246	227	208	—	—	—	—	—	—	—	—
	b	569	494	445	386	361	330	305	278	254	233	213	—	—	—	—	—	—	—	—
	c	579	503	454	398	369	341	310	286	261	239	218	—	—	—	—	—	—	—	—
Class D 6,001–8,000	a	590	512	461	410	375	350	316	295	269	245	223	208	—	—	—	—	—	—	—
	b	604	526	475	421	386	356	325	300	275	250	229	213	—	—	—	—	—	—	—
	c	618	540	487	432	395	363	334	305	281	257	235	219	—	—	—	—	—	—	—
Class E 8,001–13,000	a	—	554	501	443	406	369	343	310	286	262	241	224	208	—	—	—	—	—	—
	b	—	569	507	450	416	378	351	319	294	270	246	227	208	—	—	—	—	—	—
	c	—	583	514	456	428	389	361	327	303	278	254	230	208	—	—	—	—	—	—
Class F 13,001–25,000	a	—	—	521	462	438	398	370	336	310	285	260	233	208	—	—	—	—	—	—
	b	—	—	533	479	444	408	374	344	318	292	267	238	212	—	—	—	—	—	—
	c	—	—	547	495	451	416	379	351	325	299	273	242	216	—	—	—	—	—	—
Class G 25,001–50,000	a	—	—	559	511	457	426	384	359	332	305	280	247	220	208	—	—	—	—	—
	b	—	—	573	523	472	436	397	364	337	311	286	254	225	213	—	—	—	—	—
	c	—	—	588	534	486	445	411	368	343	318	293	260	230	218	—	—	—	—	—
Class H 50,001–100,000	a	—	—	602	546	502	455	424	372	348	324	300	266	235	223	208	—	—	—	—
	b	—	—	622	560	511	469	432	384	358	332	306	274	241	229	213	—	—	—	—
	c	—	—	642	575	522	483	440	396	368	341	314	281	249	234	218	—	—	—	—
Class J 100,001–150,000	a	—	—	661	590	531	498	448	408	378	349	321	288	257	240	223	208	—	—	—
	b	—	—	679	605	546	511	460	419	389	359	329	297	264	246	229	213	—	—	—
	c	—	—	696	621	560	525	472	430	399	369	339	304	271	253	235	219	—	—	—
Class K 150,001–200,000	a	—	—	714	636	574	538	484	441	410	378	348	313	279	260	240	224	208	—	—
	b	—	—	733	654	590	552	498	454	421	389	357	322	286	267	246	230	213	—	—
	c	—	—	751	670	605	567	510	465	432	399	367	330	295	275	253	236	219	—	—
Class L 200,001–250,000	a	—	—	770	687	620	581	524	478	443	410	376	340	303	282	260	241	224	208	—
	b	—	—	790	705	636	596	538	490	456	421	387	349	311	289	267	246	230	213	—
	c	—	—	811	724	653	612	551	503	467	432	397	359	320	298	275	254	236	219	—
Class M Over 250,000		—	—	831	742	670	628	566	516	480	443	408	369	328	305	282	260	241	224	208

* Certain grades bear definite descriptions—1 is deputy chief official; 3, power station superintendent or mains superintendent (with charge of sub-stations); 4, mains superintendent (without charge of sub-stations); 8, shift charge engineer; 8b, sub-station charge engineer; 9a, switchboard attendant.

New Books

A Record of the Scientific Work of John Tyndall. Pp. 38. London: Chiswick Press, Ltd. (For private circulation.)

This little book gives a synopsis of the work of one of the greatest of research workers and expositors of physics. Tyndall succeeded Faraday in 1867 as Resident Professor of the Royal Institution, with which he was associated for forty years, and his published books and papers contain the results of his investigations in its laboratory.

The arrangement is chronological under eight subject headings, the first of which is "Electricity and Magnetism." Tyndall's first recorded publication comes in this section—in 1850, three years before he was appointed Professor of Natural Philosophy at the R.I. This was followed by twenty-six others, one of the last being "The Electric Light" in 1879. The book also contains a summary of Tyndall's scientific career with biographical references.

Diesel Locomotives and Railcars. By BRIAN REED. Pp. 190; figs. 131. London: Locomotive Publishing Co., Ltd. Price 6s. net.

The combined effect of road competition and the industrial depression of recent years has compelled the railway engineer to consider very seriously the Diesel engine as an alternative to the steam locomotive, and signs are not wanting to show that he has found the use of the former profitable.

Despite the order employed by the author in his title to this excellent and comprehensive work, the railcar for use in branch lines and for services demanding only a small passenger-carrying capacity first showed how economical the Diesel engine could be as a service of power, and its success in this form of unit led to its being incorporated in the locomotive for hauling vehicles in the same way as its steam prototype, and particularly for shunting. The author first gives an interesting survey of the advantages of Diesel traction. Contrary to popular belief, fuel cost is not the most important factor, as even allowing for the higher efficiency of the Diesel engine and the higher calorific value of its fuel, the fuel cost per draw-bar h.p.-hour at 70s. per ton is 0.2055d. as compared with 0.2025d. for the steam locomotive burning coal at 16s. per ton. The governing factors are simplicity of operation and maintenance and the elimination of stand-by losses.

This simplicity of operation is exemplified in those parts of

the book which will be of particular interest to the electrical engineer, covering the various systems employed for transmitting the power of the engine to the driving axles. The electric system is being increasingly adopted, although the transmission losses are somewhat greater than for mechanical gearing. In all the systems developed in this country and abroad d.c. is employed, although proposals have been made in Russia to use a.c. equipment.

Descriptions and wiring diagrams are given of the various d.c. systems as well as characteristic curves, tractive-effort diagrams, and so on. The book can be recommended as a welcome contribution to the literature of what bids fair to become a very important branch of engineering practice.

Management Planning and Control. By A. G. H. DENT. (Pp. 333.) London: Gee & Co. (Publishers), Ltd. Price 10s. 6d. net.

With the growth in size and complexity of modern industry there has developed a need for something more than "business instinct" to ensure adequate remuneration for enterprise. This something is generally termed "scientific management" and its principal aims are to relate production with sales and to plan for the future with a certain amount of assurance.

A great deal of study and research, coupled with an ability to apply the results intelligently, is involved in this, leading to the institution of "budgetary control" which is the author's main theme. Mr. Dent sets out first the implications of the term and illustrates each point very lucidly, paying due regard to the personal factor which cannot be ignored in any human system.

Among the matters with which he deals are sale budgets; co-ordinating sales manufacturing and accounts; manufacturing budgets; financial and expense budgets; planning in depression conditions; statistical and graphical functions; and economic research and forecasting. An interesting section is that describing systems in actual operation in fifteen undertakings ranging from the General Post Office to the International Harvester Co., U.S.A., and including five electrical concerns.

The usefulness of the book is increased by the inclusion of a comprehensive bibliography, British and foreign, and an eight-page index.

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Shorter Notices

"Short Wave Therapy—The Medical Uses of Electrical High Frequencies," by Dr. Erwin Schlieplake (English translation of the German edition by R. King Brown). Pp. 238; figs. 94. London: Actinic Press, Ltd. Price 21s.

"Matter and Motion," by C. H. Creasey. Pp. 122; figs. 14. London: English Universities Press, Ltd.

"Taschenbuch für die Lichtobenschweissung," by Karl Meller. Pp. 189; figs. 82. Leipzig: Verlag Von S. Hirzel. Price Rm.5.

"Introduction to the Study of Physical Metallurgy," by W. Rosenhain. (Third edition—Revised and partly rewritten by J. L. Houghton.) Pp. 368; figs. 159. London: Constable & Co., Ltd. Price 20s. net.

"Electric Water Heating," by D. J. Bolton, P. C. Honey and N. S. Richardson. Pp. 189; figs. 66. London: Chapman & Hall, Ltd. Price 7s. 6d.

"Jordan's Income Tax Guide, 1935-1936." Compiled by C. W. Chivers. (32 pp.) London: Jordan & Sons, Ltd. Price 6d. This is a compact guide to the amount of income tax payable in given circumstances and the reliefs which may be claimed. A useful feature is twenty-two worked examples.

Parliamentary News (BY OUR SPECIAL REPORTER)

ON July 2nd Mr. Batey asked the Minister of Transport if he could state the number of tons of coal consumed by electricity companies, the average price paid per ton for such coal, and the total profits of electricity companies for each of the last five years.

Mr. Hore-Belisha said that the information desired was as follows:—

(1) COAL AND COKE CONSUMED BY ELECTRICITY COMPANIES.

Year.	Quantity. Tons.	Average cost per ton. s. d.
1928	2,681,338	15 10
1929	3,034,873	15 2
1930	2,965,109	15 10
1931	2,948,861	15 11
1932	3,075,356	15 8

(2) THE GROSS SURPLUS OF THE ELECTRICITY COMPANIES AND ITS APPROPRIATION

Year.	Gross surplus.	Appropriation of gross surplus.		
		Interest.	Dividends.	Depreciation and other purposes.
	£	£	£	£
1928	10,357,553	2,012,058	4,202,758	4,142,737
1929	12,158,128	2,323,106	4,681,725	5,153,297
1930	12,283,291	2,341,859	4,954,547	4,986,885
*1931	13,083,607	2,382,927	5,379,322	5,321,358
*1932	13,245,778	2,488,215	5,474,654	5,282,904

* The figure of gross surplus in these years was arrived at before deduction of income tax charge; previous to 1931 it was arrived at after deduction of income tax.

Gas Profits

Mr. Batey also asked the President of the Board of Trade if he was able to state the number of tons of coal consumed by gas companies, the average price per ton paid for such coal, and the total profits of gas companies for each of the last five years.

Mr. Runciman said that the coal carbonised by statutory gas companies in Great Britain during the years 1930-34 was as follows:—

	Tons.
1930	11,107,106
1931	11,015,553
1932	10,833,531
1933	10,603,860
1934	10,979,768

The average price per ton paid for such coal was not available.

The total profits of such companies had been:—

	£
1930	7,064,137
1931	7,292,976
1932	7,379,419
1933	7,223,268
1934	Not yet available.

Domestic Electrical Accidents

On July 2nd Mr. Temple Morris asked the Home Secretary if he could state how many fatal accidents there were during 1934 from the use of electrical apparatus in private houses; and whether he was satisfied that existing legislation was sufficient to prevent the sale of articles which could not be used with safety by inexperienced persons.

Sir J. Simon said that accidents from the use of electrical apparatus in domestic premises were not reportable to the Home Office, but fifteen fatal accidents of this kind came to the notice of the Department during 1934. The law did not prohibit the sale of electrical appliances on the ground that they might be dangerous to inexperienced persons, but only a few instances had come to the notice of the Department in which exception could reasonably be taken, on grounds of danger, to electrical apparatus placed on sale, and in such cases manufacturers generally had shown themselves ready to remedy the defects when these were pointed out to them.

Plant Obsolescence and Renewals

Mr. Horobin asked the Minister of Transport on July 8th what provision was made for obsolescence and renewals in the latest accounts of the Central Electricity Board, and what was the actuarial basis, including the anticipated sales and revenue, underlying the financial provisions which were being made to meet out of revenue as they became due the interest and sinking fund on the capital of the Central Board.

Captain Hudson, who replied, said that the Act of 1926 prescribed that the tariff should be so fixed that over a term of years, to be approved by the Electricity Commissioners, the receipts on income account should be sufficient to cover the expenditure on that account, including interest and sinking fund charges, with such a margin as the Commissioners might allow. The Commissioners had approved a term of ten years and appropriate margins for the grid tariffs; and after consultation with the Treasury had also approved the suspension of sinking fund payments and the payment of interest out of capital in accordance with the provisions of the Act. As was explained by the Board in its fifth annual report (for the year 1932) in order to ensure an economic basis for the formulation of its tariffs, it had made surveys of the probable increase in demand for electricity over the tariff decade.

The Central Board's Revenue

Mr. Horobin further asked the Minister of Transport what was the average revenue per unit sold in each area of general trading under the Central Electricity Board.

Captain Hudson said that the Board was a national undertaking for the country as a whole, and did not publish figures relating to individual areas. He understood that the average gross revenue per kWh sold by the Board in 1934 was approximately 0.4d.

Wireless "Pirates"

Last week, Major Tryon, the Postmaster-General, stated that during the first five months of this year 1,447 persons were prosecuted to conviction for installing or working wireless apparatus without a licence. He had no reason to think that the penalties laid down in the Wireless Telegraphy Act, 1904, were inadequate.

Bills Advanced

In the House of Lords last week the Ascot District Gas and Electricity Bill and the Bognor Gas and Electricity Bill were read a second time and the London Passenger Transport (Agreement) Bill, which has passed the House of Commons, was read a first time. The last Bill relates to the important railway electrification and trolley bus schemes which the Board and the railway companies are to carry out.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Selected Station Extensions

The Central Electricity Board has received the approval of the Electricity Commissioners to extensions of selected stations. Last year sanction was given for the installation in selected stations of 535,000 kW valued at £7,500,000, and the full programme of extensions to be initiated during 1935 will aggregate about 650,000 kW, which, together with additional boilers and other equipment, will result in further orders of an estimated value of £7,250,000. The greater part of this new plant will be in operation by the winter of 1937. The following are the details of the extensions for which directions have been issued :—

Area and Station.	Owners.	Turbo plant kW.	Boilers. (lb. per hr.).
Central Scotland :			
Dalmarnock	Glasgow Corp.	1×50,000	3×200,000
Clyde's Mill	Clyde Valley Co.	1×30,000	—
N.W. England and N. Wales :			
Barton	Manchester Corpn.	1×50,000	2×200,000
Stuart Street	Manchester Corpn.	—	1×130,000
Mid-East England :			
Thornhill	Yorkshire E.P. Co.	1×30,000	4×100,000
Kirkstall	Leeds Corpn.	1×30,000	2×200,000
Neepsend	Sheffield Corpn.	1×30,000	2×150,000
		2×1,500,000 gal. cooling towers	
Central England :			
Hams Hall	Birmingham Corpn.	1×50,000	2×250,000
		1×2,670,000 gal. cooling tower	
Ocker Hill	West Midlands J.E.A.	1×15,500	—
Longford	Coventry Corpn.	1×30,000	2×150,000
		2×660,000	gal. cooling towers
S.E. England :			
Brimsdown	North Met. E.S. Co.	1×20,000	2×210,000
		1×33,000	—
		2×1,000,000 gal. cooling towers	
Battersea	London Power Co.	—	3×300/375,000
Croydon	Croydon Corpn.	1×30,000	1×150,000
			1×13,500
Southwick	Brighton Corpn.	1×30,000	2×180,000
S.W. England and S. Wales :			
Upper Boat	South Wales E.P. Co.	1×20,000	—
Southampton	Southampton Corpn.	1×25,000	1×160,000

Refrigerator Sales

The demand for refrigerators is rapidly increasing in Torquay, according to a statement made by the Devon Electric & General Services, Ltd., of Union Street, in announcing that their entire window display, consisting of seven B.T.H. models, was sold out in one day.

"Osram" Lamp Works Extensions

Considerable extensions are being made to the G.E.C. "Osram" lamp works at Wembley. The present factory is 560 ft. long by 80 ft. wide and has three floors, which occupy an area of 141,000 sq. ft. The new extension shown in the accompanying picture will add a further 400 ft. to the present factory. In addition, two wings which are being constructed on the west side will each measure 80 ft. by 80 ft. The total

Part of the extensions to the "Osram" lamp works in course of construction

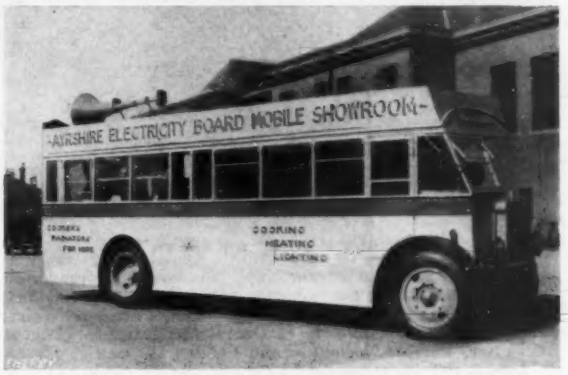
floor area of the new extensions will be in the neighbourhood of 143,000 sq. ft., bringing the total area of the factory up to approximately 280,000 sq. ft.

Wireless Patent Agreement

Marconi's Wireless Telegraph Co., Ltd., has concluded an agreement with British Radiostat Corporation, Ltd., and has acquired rights under present and future patents controlled by the latter company, including exclusive licensing rights under the "Stenode" broadcast reception (sound and television) patents in Great Britain and Ireland. All future applications for licences in the last-mentioned field should be addressed to Marconi's Wireless Telegraph Co., Ltd., Electra House, Victoria Embankment, London, W.C.2.

A Mobile Showroom for Ayrshire

Since the scattered nature of the Ayrshire Electricity Board's electricity undertaking makes the establishment of permanent showrooms in all the burghs and rural areas an uneconomic proposition at present, a travelling showroom has just been put into service to educate the public in electrical matters.



The Ayrshire Electricity Board's new mobile showroom

The 1,100 sq. miles which the Board now serves offer plenty of scope for the lectures and demonstrations which are being given on domestic electrical appliances, and it is not proposed to confine the activities of the showroom only to areas where electricity supplies are already available. Blue in colour, the vehicle has a distinctive appearance, and its back can be removed to disclose a well-equipped model all-electric kitchen containing a cooker, water heater, fires, tubular heaters, fans, and other up-to-date appliances. To operate the apparatus a petrol-driven generator has been installed in the front portion of the vehicle. A loud-speaker on the roof makes it possible for the demonstrator to be heard at a considerable distance, and music can be provided by a gramophone. Generally the showroom stays one or two days at each town or village, its visits being heralded by advertisements in the local Press. Mr. William C. Bexon, engineer and general manager of the Board, tells us that results of the first three weeks' tour have proved highly satisfactory. A photograph of the members of the Board, showing the interior of the vehicle, appears on page 64.

Concrete Lamp Columns

We are informed that Concrete Utilities, Ltd., have received the following letter in reply to their advertisement "Scarborough helps to prove" which appeared on page 5 of our Advertisement Supplement on June 28th :—

"Observing that the 'sweet music' mentioned in your advertisement lacks words, the writer appends a suggestion for your consideration—

No cost to maintain, no paint to provide,
A splendid smooth surface, both out and inside.
More strong than cast iron, and will not corrode.
Priced cheaply, stand shocks, and will brighten the road,
So stand up and carol, to our latest tune,
That 'every lamp column will be concrete soon.'"

The E.A.W. House at Bristol

Particulars of the all-electric house which the Electrical Association for Women is having built at Bristol are given by Mrs. Dorothy Newman, the originator of the scheme, in the current issue of the *Electrical Age*. The selling price of the house, complete with a generous electrical equipment, has been fixed at £1,000, a genuine figure which the builder will be prepared to repeat. This price naturally restricts design and equipment but, although some of the Association's ideas have had to be given up, it is hoped to show a distinct advance in many directions. Mrs. Newman states that although the treatment of the house is modern it is not aggressively so and all "stunts" have been avoided. The site chosen is an average one and the living-rooms will be arranged so as to get the sun all day, while the bedrooms are cool at night. A feature of the hall will be a cloakroom with a separate "pylon" at the bottom of the stairs which will house the telephone and carry a narrow fire to warm the hall; adjoining this will be a built-in seat. Built-in fittings are to be employed extensively in both the dining and living rooms which by the opening of folding doors will form a room 30 ft. long; folding doors will permit the hall to be used also when entertaining. The kitchen, too, will have all its equip-

ment (including a refrigerator which the E.A.W. is unanimous in considering a necessary part of the house) built in. There will be no metal to clean in the whole house.

Orders Recently Booked

Among orders recently received by Messrs. A. E. Morrison & Sons, Ltd., for their Morrison-Electric vehicles are thirty-three of the 10-12 cwt. type for the Portsea Island Co-operative Society, an " Air Stream " van (similar to the Sunderland vehicle illustrated in the accompanying photograph) for Portsmouth City Council, and various models for firms at Wolverhampton, Walsall, Darwen, Bournemouth, Liverpool, London, Leicester, Bedford, Brighton and Sydney (Australia).

A Morrison electric " Air Stream " van

Among the orders received by the Underfeed Stoker Division of International Combustion, Ltd., during the past month is one for ash-handling plant for the Deptford East station of the London Power Co. Alterations to plant at Pinkston (Glasgow) and Barton (Manchester) are also in hand.

The M. & C. Contracting Department

In the *Summer Number* of the " M. & C. Apprentices' Magazine " it is recalled that Messrs. Mavor & Coulson's original business was that of electrical contractors. In 1888 they commenced the manufacture of switchgear, and later added to their productions dynamos, motors and coal-cutting and handling machinery. Some time ago the switchgear business was handed over to a separate company, and now it is announced that the wiring contracting business has been disposed of to Messrs. Osborne & Hunter, Ltd., of Glasgow, who have taken over the staff of that department.

A New " Sunco " Publication

It is safe to say that every electrical trade reference bookshelf of any importance includes the catalogues of the Sun Electrical Co., Ltd., which are comprehensive guides to almost everything electrical. The full catalogue had to be split up several years ago on account of its bulk and now from time to time a new section is issued. The section covering appliances for domestic and small industrial use has reached a new edition. It contains illustrated particulars and prices of a wide range of cooking, water-heating, heating, refrigerating and labour-saving apparatus.

Prices of Materials

Messrs. Frederick Smith & Co. report, July 10th: Electrolytic copper bars, £34, £1 inc. Ditto, ditto, wire rods, £41, £1 inc. Ditto, ditto, h.c. wire, 6½d., ¼d. inc. Silicium bronze wire, 7¼d., ¼d. inc.

Messrs. Henry Gardner & Co., Ltd., report, July 10th: No change in the price of copper bars (best selected), sheet and rod and English pig lead.

Messrs. Edward Till & Co. report, July 10th: No change in the price of India-rubber, Para fine.

German Cable Works Veto

The State veto on the establishment of new works for the production of cables and insulated conductors, which was to have lapsed on June 30th, has been prolonged until the end of June, 1936.

Electrical Exhibition

The Cheltenham Electricity Committee has made arrangements to hold an electrical exhibition in the town hall and winter garden next October.

Economic Conditions in Poland

The economic situation in Poland is little different now from what it was a year ago, but a Department of Overseas Trade report indicates signs of improvement and a more optimistic tone. Although the country is itself producing a considerably increased quantity of electrical equipment, H.M. Vice-Consul at Katowice suggests that Upper Silesia offers an opportunity to British manufacturers to compete with foreign suppliers of electrical and allied apparatus, including steam turbines, rectifiers for colliery plant, and motors for steel and rolling mills. In spite of the diminished total of imports into Poland from all sources in 1934, imports of all classes of goods from the United Kingdom increased from 83 million zloty to 86.2 million zloty. Radio receivers and valves are produced locally, but certain luxury sets and radio-gramophones are imported in small quantities, although the duty, calculated by weight, is very high.

The Brussels Exhibition

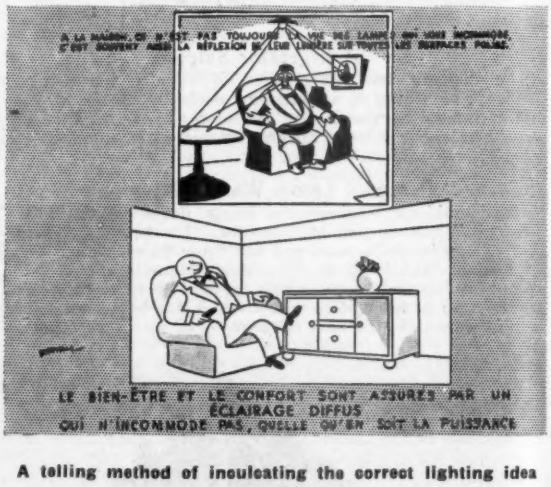
The British Pavilion at the Brussels Exhibition has been attracting a good deal of attention, especially during the recent British Week. The interior lighting equipment, which is particularly attractive, was specially designed and manufactured by the Strand Electric & Engineering Co., Ltd., and over a hundred G.E.C. floodlights are used to illuminate the exterior. The whole of the lighting and power requirements of the Pavilion are being provided by two Diesel generating sets supplied by the English Electric Co., Ltd., and Callender wires and cables are used exclusively for the electrical installation throughout the building. Among the electrical exhibitors are the English Electric Co., Ltd.; Hewittic Electric Co., Ltd.; Ideal Home Electrical Appliances; and R. A. Lister & Co., Ltd. One of the most interesting sections of the Alberteum Palace of Science is the " Planetarium," by means of which the complicated movements of the heavenly bodies can be demonstrated on an artificial sky, about 70 ft. in diameter, by means of an ingenious system of speeding up movements that would normally take days, years, and even centuries. Historical and modern wireless exhibits have been arranged by the Belgian Wireless Company in collaboration with the Marconi Company and the Science Museum, South Kensington, while the echometer, an automatic ocean depth sounder, is also demonstrated.

The Electrical Road

In the course of editorial comment on the industrial developments that are taking place in England and parts of Europe the *Electrical World* aptly remarks: " There is only one road to industrial recovery, and it is paved with electricity."

Light Propaganda

As we have observed on previous occasions, the monthly *Bulletin* of the A.P.E.L. (the French equivalent of our E.D.A.) is a bright little journal with a considerable leavening of humour. From the July issue we reproduce herewith a drawing which illustrates the contentment brought about by the use of properly diffused light, as contrasted with a naked lamp which gives rise to all kinds of undesirable reflections.



A telling method of inculcating the correct lighting idea

Italian Foreign Electrical Trade

The imports of foreign electrical machinery and cognate material into Italy during the three months ended with March last attained a value, at 60 lire to the £, of £306,650, as compared with £256,500 in the corresponding period of 1934. There was a decline during the same period in the exports of similar material from Italy from £119,163 to £102,066.

The C.M.A. in New Zealand

Recognising the importance of wiring installations, the Cable Makers' Association awarded two gold medals to be competed for at a theoretical and practical wiremen's registration examination at Christchurch, New Zealand, in September last year. The medal in the practical section was won by Mr. E. J. Tucker, and that in the theoretical section by Mr. S. L. Boyd. Both men are employés of the Christchurch Municipal Electricity Department. The medals were presented a few weeks ago by the Mayor of Christchurch, Mr. D. G. Sullivan, M.P., who thanked the Association for its kind thought in encouraging official electrical work. Mr. E. Hitchcock, the general manager of the Department, said that the gift of medals was an endorsement from a new quarter of the well-recognised principle that handiwork, good as it might be,

The electrical section at the Royal Agricultural Show, Newcastle-upon-Tyne

was not as good as handiwork applied with a knowledge of the principles behind it. Hit-or-miss methods were not good enough with electricity, and a knowledge of the principles behind electricity was necessary not only for those working with it, but also for those for whom the work was done. The C.M.A. representative in Christchurch, Mr. C. B. Cromb, referred to the advantages which the enterprise of the Cable Makers' Association had bestowed upon the electrical industry.

Social Events

On June 29th, in glorious weather, about 450 members of Tecalemit, Ltd., journeyed to Cliftonville for the firm's annual outing. Luncheon was served in the ballroom at the Queen's Highcliffe Hotel, presided over by Mr. R. A. Chalmers, managing director, supported by Mr. A. E. Leonard, chairman, and Mr. S. G. Gates, director. Those present included Messrs. W. Parslow, general manager; F. A. Dennison, secretary; A. Sewell, sales manager; and Mr. Bowman, works manager.

Members of the Supaul Social Club (Superlamp, Ltd.) visited Margate on June 30th for their annual outing, and had a very enjoyable time in ideal weather conditions.

The seventh annual sports meeting of Johnson & Phillips Sports Club was held in delightful weather on the company's sports ground at Kidbrooke last Saturday. Altogether 250 competitors took part, and close finishes were a feature throughout the meeting. Mr. Burge, chairman of the Club, who has recently recovered from a serious illness, welcomed the chairman, Mr. G. L. Wates, and directors of the company, including Sir Philip Dawson, M.P. Mr. Wates then presented the prizes. He referred to the good work that the honorary secretary, Mr. W. F. Smith, had done for the club during the last sixteen years.

The annual cricket match between the frequency change section of the Birmingham Corporation Electric Supply Department and representatives of electrical manufacturers was held on July 2nd on the sports ground of Messrs. Wales, Ltd., Shirley. The Corporation team was captained by Mr. R. H. Rawll and the manufacturers were led by Mr. Jenkins (B.T.H.), the match resulting in a win for the manufacturers. Afterwards the party adjourned to the Red Lion Hotel, Shirley, to partake of supper, followed by a smoking concert.

The Royal Show, Newcastle

Presiding at a Farmers' Electrical Conference held under the auspices of the Electrical Development Association, at the Royal Agricultural Show, Newcastle-upon-Tyne, last week, Lord Allendale stated there were 600 electrified farms in North-East England, and about 10,000 throughout the country. The drawback in the electrification of farms, he said, was the heavy capital cost, and he appealed to E.D.A. to try to get the charges reduced. In an address on "Advice to Farmers on Installing Electricity," Mr. H. D. Phelps, of the Agricultural Section, North-Eastern Electric Supply Co., Ltd., urged farmers to seek the expert advice of his company when they contemplated electrification. He described several methods and the various uses to which electricity could be put on the farm.

At previous Shows the large quantities of steam required for sterilising purposes, &c., were provided by a portable steam engine, using coal as fuel, thus bringing dust and dirt in close proximity to the dairy, where the utmost cleanliness has to be observed. Through the co-operation of the North-Eastern Electric Supply Co., Ltd., and Messrs. A. Reyrolle & Co., Ltd., electrical plant was used at the recent show. A Reyrolle electrode steam raiser with automatic control met all the demands for steam, and the machinery in the dairy was driven by a 7½-h.p. motor supplied by the same company.

The Duke of Kent, president, inspecting exhibits of electrically operated agricultural machinery at the Royal Agricultural Show, Newcastle-upon-Tyne

Trade Announcements

Messrs. Fenemore, Howlett & Co., Ltd., electrical and wireless engineers, Windsor, have moved to new premises at 51, St. Leonard's Road.

Seal Electric Agencies, Ltd., of 7, Edward Street, Westminster, S.W.1, has changed its name to Seal Electric, Ltd., as from June 21st.

New Electricity Showrooms

Workington Electricity Department has opened a new showroom in Oxford Street. It is proposed to floodlight the building at night.

Willesden Town Council has approved plans for new electricity showrooms.

Wimbledon Corporation has approved plans for the erection of electricity stores and offices in Durnsford Road.

The West Kent Electric Co., Ltd., has this week opened new showroom premises at 24, Station Approach, Hayes.

Proposed Reductions of Capital

The High Court has confirmed the reduction of the capital of Messrs. Ruston & Hornsby, Ltd., from £2,500,000 to £1,680,000.

A petition will be heard on July 16th by Mr. Justice Eve for the confirmation of the reduction of the capital of Messrs. Robey & Co., Ltd., from £300,000 to £6,398 3s., and the sanctioning of a scheme of arrangement.

A petition for the confirmation of the reduction of the capital of Pneulec, Ltd., has been presented to the High Court and is now pending. Claims of creditors at June 22nd must reach Mr. T. B. Hooper, of Messrs. Hooper Ryland & Boddington by to-morrow (July 13th).

New Catalogues and Lists

Simplex Electric Co., Ltd., 159, Great Charles Street, Birmingham. A copy of a new leaflet on prismatic lighting units.

Crompton Parkinson, Ltd., Bush House, W.C.2.—An illustrated booklet dealing in a general way with Crompton switchgear.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Pamphlet No. 967 on earth leakage trip switches, and an illustrated informative booklet entitled "Modern Farming."

Ferguson, Pailin, Ltd., Higher Openshaw, Manchester, 11.—Pamphlets on 33,000-V switchgear at Tir John power station and on the type "EO" lift-out fuse.

Evershed & Vignoles, Ltd., Acton Lane Works, Chiswick, W.4. have published a booklet on "Recording Instruments." It is printed on art paper and is well illustrated.

Bruce Peebles & Co., Ltd., Edinburgh.—A booklet (No. 91) on power transformers.

Hackbridge Electric Construction Co., Ltd., Walton-on-Thames.—A catalogue of on-load tap-changing equipment.

Dissolution of Partnership

Leander Service, radio and electrical engineers, 46, Gloucester Terrace, London.—Messrs. Philip Alexander and Reginald Edward Lee have dissolved partnership.

Private Arrangement

A. Oliver and **C. W. Newman** (trading as "The Electrical Equipments"), electrical engineers, 36, Worcester Villas, Hove, Sussex.—A meeting of creditors was held on July 3rd at the offices of Mr. A. E. Orbell, 6/7, Old Steine, Brighton. The statement of affairs showed ranking liabilities of £458, of which £285 was due to the trade. The assets were estimated to realise £95. After allowing for preferential claims the net assets were £84, leaving a deficiency of £374. It was decided that the matter should be dealt with under a deed of assignment to Mr. Orbell as trustee.

Meeting of Creditors

H. G. Weaver, Ltd., electrical and radio engineers, Bristol.—Meeting of creditors held on July 9th.

Bankruptcy Proceedings

J. L. Gottlieb, wireless maker, Ranulf Road, Hampstead.—An application was made on July 4th to Mr. Registrar Warmington at the London Bankruptcy Court for an order of discharge on behalf of this debtor, who failed last March with provable debts of £7,037 and assets of £7. Mr. S. W. Hood, Official Receiver, reported that a previous bankruptcy was recorded against the debtor in June, 1927, from which proceedings he had been discharged. Following that failure he acted as director and manager of J. L. Gottlieb & Co., Ltd., and subsequently of Aeonic Radio, Ltd., which purchased the assets of that company and itself went into voluntary liquidation in June, 1930. The debtor was subsequently interested in Electrical & Radio Products, Ltd., which was formed to purchase the assets of Aeonic Radio, Ltd., and in Electrical & Radio Products (1931), Ltd., which went into compulsory liquidation in April, 1934. The debtor attributed his insolvency to liabilities under guarantees given in connection with the before-mentioned companies. The discharge was suspended for twelve months. An application was also made for leave of the Court for the debtor to act as manager of the Allied Electrical & Furniture Industries, Ltd., of Park Avenue, North Circular Road, N., which was formed in March, 1935, to carry on the manufacture and sale of radio and television instruments, &c. After hearing Mr. Dickson (East & Deeks) in support of the application his Honour gave the necessary approval.

T. O. Lake, "Wayside," Whatton-in-the-Vale, Notts, formerly North Scarle, Lincs., previously electrical factor.—The public examination of this debtor was held on July 4th at the County Court House, St. Peter's Gate, Nottingham. Debtor, whose deficiency amounted to £43, attributed his failure to lack of capital and selling at an insufficient margin of profit. The examination was closed.

Rockall & Co., electrical contractors, 7-8, Ham Yard, Piccadilly, W.—An application was made on July 2nd to Mr. Registrar Mellor at the London Bankruptcy Court for an order of discharge on behalf of F. G. H. Rockall, who carried on business as above and failed in May, 1934. Mr. T. C. Cadwgan, Assistant Official Receiver, reported that the ranking liabilities amounted to £953 and the assets had realised £25. The debtor had stated that following his demobilisation from H.M. Forces he and two other persons in June, 1919, began business as "Rockall & Tollett" with a capital of £400, one half of which he provided from a legacy. The partners withdrew from the firm in 1921 and 1927 respectively, each receiving £100 for his interest in the business. After 1929, consequent upon general trade depression, it was difficult to collect the book debts, and in March, 1934, he ceased to trade. The failure was attributed to lack of capital, bad debts and general trade depression. The discharge was suspended for six months.

F. E. Lansdown, 68A, High Street, Winsford, Cheshire, radio and electrical engineer.—This debtor attended at the Petty Sessional Court House, Edleston Road, Crewe, recently for his public examination. He had returned unsecured liabilities of £608, with assets of £110 and a deficiency of £498. He said he was employed as a cinematograph operator, and while so engaged commenced business as a wireless dealer in March, 1934, at 68A, High Street, Winsford, with a borrowed capital of £106, and acquired plant on hire-purchase terms. He employed a manager for the shop, but himself ordered stock. Debtor estimated his average weekly takings at £16, but no books of account were kept. He agreed that he had sold goods on credit, and that the main cause of his failure was lack of supervision of the business. The examination was closed.

R. J. Heath, trading as "Whitchurch Radio Service", 3, Brownlow Street, Whitchurch, Salop, lately Highgate, Whitchurch, wireless engineer and dealer.—The public examination of this debtor was held at the Petty Sessional Court House, Edleston Road, Crewe, recently, and according to the statement of affairs submitted there were ranking liabilities of £669 and assets of £313. He attributed his failure entirely to a fire. The examination was adjourned.

F. E. V. Hooper (Hooper's Service Station), electrical engineer, 277, South Road and Walkley Road, Walkley, Sheffield.—First meeting held July 10th. Public examination July 25th at the County Court Hall, Sheffield.

I. L. Lawrence, electrician, 11, Grand Parade, Brighton.—Discharged as from June 13th.

M. Morris, radio dealer, 3, Thornhill Road, Plymouth.—Receiving order made July 3rd on debtor's own petition.

J. Keddle, electrician, 90, Leander Road, Brixton, London, S.W.—Trustee, Mr. S. W. Hood, Bankruptcy Buildings, Carey Street, W.C.2, Official Receiver, released June 25th.

W. E. Magson, electrical engineer, 54, Vyner Street, York.—Trustee, Mr. J. S. Snowball, Bank Chambers, Scarborough, Official Receiver, released June 19th.

G. E. Morris, radio dealer, 3, Duke Street, Whitwell.—Trustee, Mr. L. J. Clegg, 14, Figtree Lane, Sheffield, Official Receiver, released June 19th.

A 45,000-kVA, 132-kV, three-phase Metrovick transformer weighing 100 tons mounted on a special railway "crocodile" ready for transport from Trafford Park to Northfleet, to the order of the Central Electricity Board

Company Liquidations

Phillips, Brown (Manchester), Ltd., wireless distributors, &c., 71, High Street, Manchester.—A meeting of creditors was held recently at the offices of Messrs. Harry L. Price & Co., I.A., 47, Mosley Street, Manchester. The statement of affairs showed ranking liabilities of £18,612, and net assets of £2,975, leaving a deficiency of £15,637 as regarded the creditors. The issued capital was £9,500, and so far as the shareholders were concerned, there was a deficiency of £25,137, which was attributed chiefly to the following: goodwill written off, £1,782; formation expenses, £178; shares in Nulite Fittings, Ltd., £4,996; debit balance on profit and loss account, £3,543; and amount written off account of Nulite Fittings, Ltd., £14,594. No resolutions were passed and the voluntary liquidation of the company will be continued with Mr. A. T. Eaves as liquidator. The following are creditors: Dulcetto Polyphon, Ltd., £645; L. G. Hawkins & Co., Ltd., £524; B. Whitworth, £250; Kolster Brandes, Ltd., £145; Drake & Gorham (Wholesale), Ltd., £127; Incandescent Fittings, Ltd., £118.

Nulite Fittings, Ltd., wireless, television and electrical dealers, 71, High Street, Manchester.—The statutory meeting of creditors was held recently at the offices of Messrs. Harry L. Price & Co., when it was reported that the company had gone into voluntary liquidation, and Mr. A. T. Eaves had been nominated as liquidator. The statement of affairs showed ranking liabilities of £21,240 and net assets of £2,641, leaving a deficiency as regarded the creditors of £18,599. The issued capital was £5,000. The company's position was attributed to heavy overhead expenses, lack of working capital, and discounts on hire-purchase agreements. During the discussion dissatisfaction was expressed at the position disclosed, but the meeting terminated without any resolution being passed. The voluntary liquidation of the company will, therefore, be continued with Mr. Eaves as liquidator.

Nulite Finance Corporation, Ltd., wireless trade financiers, 71, High Street, Manchester.—The creditors met recently at the offices of Messrs. Harry L. Price & Co. The statement of affairs showed ranking liabilities of £1,496, of which £1,437 was due to Nulite Fittings, Ltd. Assets totalled £276, leaving a deficiency of £1,220. The issued capital was £3. It was decided that the voluntary liquidation of the company should be continued with Mr. A. T. Eaves as liquidator.

Warwickshire Electric Refrigerator Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. V. Summers, Kingham Chambers, Abingdon Street, Northampton.

Davis Electrical Co., Ltd.—Meetings of creditors and members July 29th at 69-73, Cannon Street, London, to receive an account of the winding-up by the liquidator, Mr. B. G. Arthur.

Southern Factors, Ltd.—Winding up voluntarily. Liquidator, Mr. W. W. Paul, 26, Great Eastern Street, London.

Lighthouse Electrical Co., Ltd.—Meeting of creditors July 15th at 18, Essex Street, Strand, London, W.C.2.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—STREET LIGHTING IMPROVEMENTS.—The Lighting Committee proposes to improve the lighting in Market Street; to substitute electric for gas lamps at Victoria Bridge and Victoria Road; and to erect twenty-nine electric lamps in Abbotswell Road and fourteen in South Deeside Road.

Ashford (Kent).—PROPOSED SUPPLY EXTENSIONS.—East Ashford Rural District Council is to ascertain the probable number of consumers at Aldington and Smeeth with a view to electricity being supplied to the areas by the Kent Electric Power Co. The Council also intends to take steps to secure the provision of supplies for Godmersham and Chilham.

Bagshot.—WINDLESHAM.—Owing to wayleave difficulties the Ascot District Gas & Electricity Co. is unable to proceed with the erection of overhead lines to supply Windlesham, and has informed the Rural District Council that the cost of underground mains will be prohibitive unless a contribution of £350 is made towards the cost. The Council is communicating with the Electricity Commissioners regarding the matter.

Blackburn.—LOAN.—Sanction is being sought by the Town Council to borrow £30,000 for future expenditure on sub-stations and £50,000 on electricity mains and services.

Blackpool.—LOAN.—The Finance Committee is applying to the Electricity Commissioners for a loan of £115,000 for the electricity undertaking.

Bradford.—SUB-STATION EXTENSION.—The Electricity Committee has decided to extend the Dudley Hill sub-station and to install h.v. switchgear, the total estimated cost being £7,580.

CHANGE-OVER.—A change-over is to be effected in the Bolton Road district at a cost of £875.

Bristol.—LOAN FOR APPLIANCES.—Sanction is being sought to borrow £240,000 for the purchase of domestic appliances during the next three years. Owing to the great increase in the hiring of domestic apparatus the grant of £33,000 made in February, 1933, has been entirely exhausted.

Buckhaven and Methil.—ELECTRIC-DISCHARGE LIGHTING.—The boulevard from Muiredge to Leven is being provided with a new lighting system utilising 400-W and 250-W electric-discharge lamps.

Bude.—LIGHTING SCHEME APPROVED.—The Urban District Council has accepted a scheme submitted by the Bude Electric Supply Co. for public lighting in the Bude-Stratton area for a period of five years.

Canada.—MONTHLY OUTPUT FIGURES.—The output of the central electricity stations of Canada for the month of April totalled 1,881,028,000 kWh, as compared with 1,697,909,000 kWh for the corresponding month of last year. The export of energy to the United States increased from 63,105,000 kWh to 97,474,000 kWh.

Canterbury.—REVISED TARIFF.—The Town Council has revised the two-part tariff as from the Michaelmas quarter, and the "unit" charge will be ½d.

Cardiff.—SUB-STATIONS.—The Electricity Department is to erect three new sub-stations on the Insole estate, Pencisely estate, and at Cowbridge Road.

Carlisle.—LOANS.—The Electricity Committee has obtained sanction to borrow £15,000 for mains and services and £5,000 for meters. Sanction is now to be sought to borrow £1,282 for additional housing estate mains.

Cheltenham.—SUPPLY TO SWINDON.—The Electricity Committee is to extend mains at a cost of £982 to provide a supply to the village of Swindon.

Coventry.—LOAN.—The City Council has applied for a loan of £3,030 for mains and plant.

Coulsdon and Purley.—A LARGE STREET LIGHTING INSTALLATION.—One of the largest installations of electric street lighting in Britain is now being brought into service in the Coulsdon and Purley urban district, where the County of London Electric Supply Co., Ltd., has contracted to light over seventy-three miles of streets. Some five miles, covering the London to Brighton and London to Eastbourne main roads, are now lighted by "Mazda Mercra" electric-discharge lamps. On these roads 180 lighting units are spaced at approximately 150 ft., being staggered on each side of the road and mounted at a height of 25 ft. from the ground level. Each unit consists of a 400-W "Mercra" lamp in a B.T.H. "Diron" lantern, with internal reflectors and prismatic outer glasses. The light is thus reduced and cut off in the pavement direction and amplified up and down the road. Several spots hitherto extremely dangerous to pedestrians and motorists have now been rendered practically accident-proof.

Cowes (I.o.W.).—ELECTRICITY IN COUNCIL HOUSES.—The Urban District Council has granted the Isle of Wight Electric Light Co. permission to install electric lighting in a number of Council houses.

Crewe.—EXTENSION OF SUPPLY.—The Town Council has received sanction to a loan of £1,460 for extending the supply to Wistaston Green.

Dundee.—TARIFF CHANGES.—The Corporation has adopted a recommendation that the prepayment meter charge shall be 3.44d. per kWh, approximately ⅛d. in excess of the ordinary rate under Scale A. Under Scale C, to domestic consumers on fixed area charge, the first "unit" charge is to be reduced from 0.75d. to 0.7d., and the second "unit" charge from 0.625d. to 0.5d.

Durham.—SCHOOL INSTALLATIONS.—The Board of Education has approved schemes for the installation of electric lighting in schools at Blaydon East, Ford, Oakenshaw, and Washington Biddick.

Eastbourne.—SUPPLY EXTENSIONS.—The Electricity Committee is to provide supplies to the Ratton estate at a cost of £3,553, Selwyn Drive estate (£132), Westlord estate (£330), Hawthylands estate (£127), Westham (£121), and Hailsham (£592).

LOANS SANCTIONED.—Sanction has been obtained to borrow £4,500 for extensions in the rural area and £3,120 for extensions to the Bolney Wood estate.

East Ham.—TOWN HALL FLOODLIGHTING.—The Electricity Committee proposes to floodlight the town hall on Saturdays and Sundays, the cost to be borne by the Department as an advertising expense.

Enfield.—CHANGE-OVER.—The North Metropolitan Electric Power Supply Co. is to effect a change-over in the Essex Road and Southbury Road areas at a cost of £1,132.

SUB-STATION.—The North Metropolitan Electric Power Supply Co. is to erect a sub-station in Trinity Street.

Faversham.—TARIFF REVISION.—The Town Council has reduced the lighting charge to 5d. per kWh, and has made concessions in the special charges for large consumers and power users. There is to be a rebate of 5 per cent. for power on all quarterly accounts of and exceeding £1. The special

An effective installation of "Osram" architectural lamps at the dance hall of Walthamstow Stadium Club

domestic power rate is now 1¾d. per kWh; alternative two-part tariff, fixed charge of 10 per cent. of the rateable value per annum, plus ¾d. per kWh; business premises, £13 10s. per kW of maximum demand, plus ¾d. per kWh.

Guildford.—OVERHEAD LINES.—The Mid-Southern Utility Co. proposes to erect overhead lines to the Eastend Farm estate, Seale, while the Corporation Electricity Department contemplates doing so over Broad Street Common. The Rural District Council raises no objection in both cases.

MAINS EXTENSIONS.—The Electricity Committee is to extend mains to supply estates being developed at Chinhurst Lane and at Compton Farm.

Hailsham.—SPECIAL ORDER.—The Rural District Council has given its consent to an application by the Eastbourne Town Council for a Special Order to supply premises at Hailsham and Magham Down. The Council has approached the Weald Electricity Supply Co., Ltd., with regard to a supply to Deudney Farm, which is on the boundary of the areas of the company and the Eastbourne Council.

Hoylake.—CABLE EXTENSION.—The Urban District Council is to extend the h.v. cable from Birkenhead Road to the Sandhey estate, at an estimated cost of £248.

Hull.—PREPAYMENT METERS.—Sanction has been obtained to a loan of £15,000 for prepayment meters.

Ilford.—VEHICLE CHARGING TARIFF.—As electric vehicles are now gradually being put into use in the district the Electricity Committee has decided to introduce a special battery charging tariff of 1d. per kWh, the same as that for heating and cooking purposes.

LOAN.—The Electricity Committee has obtained sanction to borrow £25,000 for mains and services and £1,000 for sub-station plant.

India.—ILLUMINATING AIR ROUTES.—Contracts have now been placed for the provision of a chain of lights to illuminate the air route across India. The equipment ordered consists of

floodlights, beacons, illuminated wind direction indicators, aerodrome boundary lights and air obstruction lights. The route beacons will be placed about 100 miles apart all along the route from Karachi to Rangoon. The total cost of the lighting equipment is approximately £67,500, states *Reuter*.

Kirkcaldy (Fife).—TARIFF CONCESSIONS.—The Electricity Committee has recommended reductions in charges for motive power and for lighting shops, offices, and halls. For houses it recommends a fixed annual charge equal to 9 per cent. of the assessed annual rental of the house in place of the existing fixed charge equal to one-tenth of rateable value.

Lancaster.—EXTENSION INAUGURATED.—The Electricity Department has extended its area of supply to the villages of Nether and Over Burrow. At the switching-on ceremony the chairman of the Electricity Committee said that at Burrow practically 100 per cent. of the possible users had taken a supply. The scheme completes a rural circuit which includes the crossing of the river Lune by a submarine cable.

Latvia.—HYDRO ELECTRIC WORKS.—The Latvian Minister of Finance is reported to have announced that the proposed hydro-electric works in the Duna will be established by the country's own funds instead of, as was originally proposed, a concession being granted to a foreign company.

Leeds.—PURCHASE OF COOKERS.—The Electricity Committee has decided to encourage the purchase, instead of the simple hiring, of cookers, and to this end the necessary wiring for cookers sold for cash or on the hire-purchase system is to be carried out without charge.

POWER STATION EXTENSIONS.—Sanction is being sought to a loan of £380,000 for extensions to buildings and plant at Kirkstall power station. The switch house and switchgear is to be extended at a cost of £35,000.

Lincoln.—EXTENSIONS.—The City Council is to borrow £40,806 for the extension of the electricity undertaking.

Liverpool.—OIL CIRCUIT-BREAKERS.—Authority has been obtained by the Electric Power and Lighting Committee to borrow £10,175 for the provision of two oil circuit-breakers at the Clarence Dock power station.

LOWER CHARGES.—The Electric Power and Lighting Committee, acting on a report by Mr. P. J. Robinson, the city electrical engineer, has decided to make a reduction in the weekly charges paid by tenants of Corporation all-electric houses from 1s. 6d. to 1s. 2d. per week as from July 3rd.

INQUIRY.—Mr. Henry Nimmo, chief engineering inspector to the electricity commissioners, conducted an inquiry at Liverpool last week into a proposal of the Corporation to supply electricity to Prescot, Huyton-with-Roby, parts of the county borough of St. Helens and the rural district of Whiston, at present supplied by the British Insulated Cables, Ltd. There was only one objector, who contended that the ratepayers could not bear any addition to the already excessive debt which was causing difficulty to the business community; that the price to be paid for the British Insulated Cables undertaking was out of all proportion to its value; and that the electricity undertaking of the city was over-capitalised. Mr. P. J. Robinson, city electrical engineer, said that in 1930 British Insulated Cables, Ltd., supplied 2,628,670 kWh, but by 1934 the supply had increased to 4,295,687 kWh. Those figures represented a rise in revenue from £5,697 to £9,534. The population of the area had increased from 29,635 in 1931 to 37,767 in 1934. He was satisfied that the purchase price of the undertaking was in just relation to the value to be obtained. The inspector visited the area concerned.

London.—DEPTFORD.—The majority of the tenants on the Brockley estate have agreed to the proposal of the London Electric Supply Corporation, Ltd., for a fixed charge of 1s. per week and ½d. per kWh. Slot meters are to be provided and the Housing Committee has arranged to collect the fixed charge at a fee of 5 per cent.

HAMMERSMITH.—The Electricity Commissioners have sanctioned a loan of £37,831 for sub-stations and equipment, consumers' wiring installations and apparatus, meters, and equipment for a bulk supply to Chiswick.

At a cost of £1,720 a supply is to be afforded to 171 flats and shops to be erected on the site of the disused railway line between Shepherd's Bush Road and Rockley Road.

ST. MARYLEBONE.—The Council has obtained sanction to borrow £3,412 for switchgear and cabling work.

Maidstone.—CHEAPER ELECTRICITY.—The Town Council has reduced the charge for electricity for lighting places of worship to 3d. per kWh.

MAINS EXTENSIONS.—Mains are to be laid at a cost of £1,265 to supply 150 houses to be built on the Penendine Heath estate, Boxley Road, the mains are to be extended to Wateringbury (£200), and overhead lines are to be extended at an estimated cost of £645.

Maldon.—INSTITUTION INSTALLATION.—The Essex County Council Assistance Committee is to install electricity in the Maldon Institution at a cost of £247.

Manchester.—ELECTRICAL PROGRESS.—The monthly report of the Electricity Department states that there were applications for a supply from 1,877 new consumers and for additional supplies from 752 existing consumers during April, representing a load of 5,384 kW. During the month 247 orders were received for cookers, twelve for washboilers, and ninety-three for water heaters, bringing the totals on circuit to 14,721, 801, and 1,038 respectively.

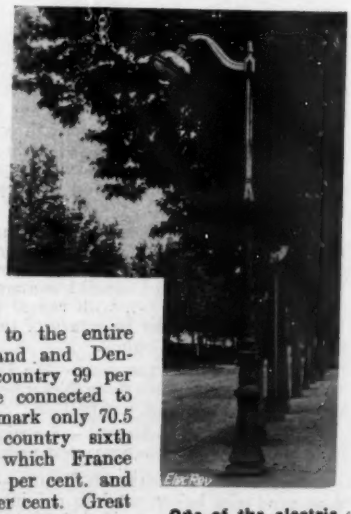
AN ELECTRICAL INSTALLATION.—Electric lighting and an electric lift are to be installed at a cost of £1,200 at the firemen's quarters at the chief fire station.

Moulton (Northants).—FARM LIGHTING.—Electric lighting is to be installed in various buildings at Northants County Council's Moulton Farm Institute.

Peterborough.—CHEAPER ELECTRICITY.—New tariffs for the supply of electricity have been adopted. The flat rate for lighting is reduced from 7d. to 5d. per kWh within the city boundary, and from 8d. to 6d. per kWh outside. Heating and domestic supply is reduced from 1d. to ½d. per kWh for the

Lighting Development in Europe

A PAPER presented by Mr. Bruno Seeger at a meeting of the German Illuminating Engineering Society, held on July 1st in Berlin, on the occasion of the Conference of the International Commission, included a considerable amount of carefully digested statistical matter on lighting consumption in Europe. Figures obtained from supply undertakings in more than a dozen countries show that the lighting load has withstood the depression.



One of the electric lighting standards in the Avenue Berthier, Lyons. The lower half is the original gas standard, the upper part and arm being added to bring the height up to 16 ft. 500-W lamps are used

Supply is available to the entire population of Switzerland and Denmark; in the former country 99 per cent. of the houses are connected to the mains, but in Denmark only 70.5 per cent., giving that country sixth place on the list in which France comes second with 93.6 per cent. and an availability of 97.6 per cent. Great Britain has nearly the same percentage of inhabitants (97.4) within reach of mains, but only 43.7 per cent. take advantage of their opportunities, making us eleventh in the table.

Outdoor lighting in urban areas is alone affected by gas competition, and the increase in the last few years in the number of electric lamps is primarily at the expense of gas. Few rural areas had street lighting before the advent of an electricity supply. Switzerland again heads the list with 97.7 per cent. of its public lamps electrified; Zurich has 86 per cent. as against 66 per cent. in 1929. Great Britain is again low in the list, in 259 supply areas the proportion being only 46 per cent. in 1932. Holland and the Scandinavian countries do well with round about 90 per cent. in the large towns. Oslo and Rome are both all-electric and only 0.3 per cent. of the Hague street lighting is done by gas. London (in 1934) was 53.8 per cent. electrified. In nearly every case a comparison of the figures for 1929 and 1932 shows a rapid increase in electric street lighting.

Except in countries where a tax is imposed on electric lighting, domestic consumption for all purposes is usually registered on one meter, but except in Great Britain, Switzerland and Norway, few people cook electrically—in the first two 10 per cent. of the homes and in other countries from 1 to 2 per cent. In Switzerland about 17 per cent. of the total domestic consumption is taken for cooking. In the table given it is assumed that the number of kWh incorrectly attributed to lighting is negligible compared with the number used for lighting by large power consumers and not separately registered.

With the exception of Finland and Switzerland, where the kWh sold for lighting is only 5.8 and 8.5 per cent. of the total, the proportion appears to be between 20 and 30 per cent. Consumption for lighting by individual consumers varies between 60 and 6,000,000 kWh per annum; in rural homes it averages between 60 and 100 kWh, but in towns may be 50 to 100 per cent. greater.

An abridged version of this paper in English has been made by Mr. W. J. Jones, manager of the E.L.M.A. Lighting Service Bureau. It provides a valuable data source for illuminating engineers and among other statistical information which it contains it shows how lighting is increasing all over Europe.

whole supply area. The reductions date from July 1st, and represent a concession of £20,000 per annum, based on last year's consumption. Meter rents are to be discontinued, except in cases of supplies necessitating special metering equipment.

Pewsey (Wilts).—EXTENSIONS.—The Rural District Council has consented to the Western Electric Supply Co. extending its overhead lines from Burbage to Great Bedwyn, and also at Ludgershall.

Plymouth.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £1,960.

Portsmouth.—LOWER CHARGES.—The Town Council has reduced the charges in the outside area as follows:—Domestic (floor area) and maximum demand tariffs, winter charge 0.75d. per kWh reduced to 0.65d. per kWh, the summer charge of 0.5d. being unchanged; alternative flat rate, summer charge reduced from 6d. to 5½d., winter charge from 6½d. to 6d. per kWh.

Sheffield.—POWER STATION EXTENSION.—As directed by the Central Electricity Board, the Electricity Committee is seeking the sanction of the Electricity Commissioners to the extension of the Neepsend power station by the installation of one 30,000-kW turbo-alternator, two boilers, and two cooling towers.

MAINS.—Mains are to be extended at a cost of £7,136, and sanction has been obtained to a loan of £26,414 for mains extensions on the Arbourthorne estate.

Southport.—GARDEN FLOODLIGHTING.—The Corporation has decided to carry out a scheme of floodlighting the North and South Marine Gardens at a cost of £505.

Thornton Cleveleys.—REDUCED CHARGE.—The charge for electricity is being reduced from 1d. to ½d. per kWh on the all-in tariff.

Tonbridge.—MAINS EXTENSIONS.—The Urban District Council is to carry out mains extensions at an estimated cost of £3,100 in the Barden Park area.

Watford.—SWITCHGEAR.—The Town Council has received sanction to loans of £35,018 for new switchgear; £10,000 for street lighting, and £75,000 for mains, services and plant.

FRINGE ORDER.—A Fringe Order has been obtained by the Electricity Committee to supply further premises in Leverstock Green in the area of the North Metropolitan Electric Power Supply Co.

West Kesteven.—OVERHEAD LINE.—The Rural District Council has consented to an overhead l.v. line at Barrowby for the Mid-Lincolnshire Electric Supply Co.

Willesden.—NEW CABLE.—Messrs. Merz & McLellan, consulting engineers to the Central Electricity Board, have notified the local authority that it is proposed to lay a 132,000-V cable from the new selected station at Fulham to the Board's transformer station at Willesden.

Workington.—EXTENSIONS.—The Electricity Committee is to borrow £5,617 for works in connection with extensions in the south ward.

Worksop.—POWER STATION SCHEME.—Following investigation of various schemes, the Town Council has tentatively approved one which includes the erection by a company of a thermal generating station which will generate electricity and pass out the residue of the steam for sale.

Worthing.—PUBLIC LIGHTING CHARGES.—The charges for public lighting have been reduced from 1.75d. to 1.65d. per kWh, and for the water undertaking from 0.9d. to 0.65d. per kWh.

LOWER METER RENTS.—The Town Council, in place of reducing charges, has decided to lower meter rents by 6d. per quarter.

United States.—PROPOSED WORLD POWER CONGRESS.—President Roosevelt has asked Congress for authority to invite a third World Power Congress to meet in the United States in 1936, states *Reuter*.

Traction

Great Britain.—SOUTHERN RAILWAY ELECTRIFICATION.—Speaking at a luncheon on July 4th following the inauguration of the London to Eastbourne electrification scheme, the Lord Mayor of London, Sir Stephen Killik, said that electricity had several obvious advantages, but involved huge expenditure. The Southern Railway could claim to be the pioneers of railway electrification and had electrified more lines than all the other railways in the country put together. Mr. R. Holland-Martin, chairman of the Southern Railway, stated that up to the present every scheme had exceeded expectations, and he had no doubt the new line would do likewise. The electric trains would mean an increase of at least 24 per cent., and in some cases 127 per cent., in the number of services, and there would be a saving in time of fourteen minutes on the journey from London to Eastbourne, sixteen from London to Hastings, and sixteen from Brighton to Eastbourne. The motor coaches and buffet cars on the new services were the first in the world to be fitted with a new type of airstream ventilators which provided a continuous supply of fresh air from outside without causing draughts. Referring to the demands for the electrification of the "short route" from London to Hastings, Mr. Holland-Martin stated at a banquet held at Hastings that the line with its narrow tunnels, &c., made electrification a difficult problem, but he assured inhabitants of the town that with their co-operation the railway would continue to provide better and better services. The Lord Mayor was greeted on the station platforms at Eastbourne, Bexhill and Hastings by their respective Mayors.

Holland.—RAILWAY ELECTRIFICATION.—Work has now been practically completed on the electrification of the railway between Rotterdam and the Hook of Holland and electric trains are expected to be in regular operation on the line in the near future. Work is also in progress on the section between Haarlem and Zandvoort, and is expected to be completed by next October.

Newport.—THE TRANSPORT SYSTEM'S FUTURE.—A recent proposal made to the Corporation by the Western Welsh Omnibus Co. was for the purchase outright of the tramway system of the town, and the Corporation decided not to sell or to scrap the trams. The Tramways Committee has decided, however, to consider a further proposal from the Western Welsh Co. to discontinue the tramways service and to substitute a service of omnibuses run by the company on a profit-sharing basis with the Corporation.

New Zealand.—RAILWAY ELECTRIFICATION.—According to the *Electrical Engineer and Merchandiser* (*Australia*) the deviation of the New Zealand north island main trunk railway between Wellington and Tawa Flat involves such great lengths of tunnel that electrification is essential, and it has been decided to carry this electrification beyond Tawa Flat to Paekakariki, a distance of a little more than 27 miles from Wellington. Energy at 1,500 volts d.c. will be supplied to the overhead system from five sub-stations, two of 1,200 kW capacity and three of 600 kW. It was decided that mercury arc rectifiers would be used in these sub-stations, and after nearly 18 months of exhaustive inquiry as to the relative suitability of steel and glass-bulb rectifiers the New Zealand Government has placed an order for the whole equipment of glass-bulb type with the Hewittic Electric Co., Ltd. The order comprises seven 600-kW 1,500-V d.c. rectifiers, which will be under supervisory control from the Wellington terminal of the line. Reyrolle supervisory equipment is to be employed.

Wirral.—RAILWAY ELECTRIFICATION.—The proposal to electrify London suburban railway lines has led to a revival of the question of electrification in the Wirral area. Plans were drawn up by the L.M.S. Railway Co. some years ago, and representatives of the company inspected the line again this week, during a tour of the north.

Communications

Afghanistan.—WIRELESS STATIONS.—A contract has been signed on behalf of the Government by which the Marconi Company is to erect five wireless stations. According to *The Times*, the most powerful of these will be situated in Kabul. The four others are to be erected at Maimene, Khanabad, Khost and Diyazungi. The Kabul station, with its short-wave long-range installation, will be capable of communicating with Tokyo, Melbourne, London and Rio de Janeiro. The other stations are to be used for internal communications in the Afghan kingdom.

India.—NEW BROADCASTING STATION.—The Indian State Broadcasting Service intends to erect its first transmitting station at Delhi, and the work is to be put in hand soon.

Spain.—RADIO AND NAVIGATION.—The increasing number of automatic wireless beacon transmitters of the type installed in many lighthouses has made it more essential than ever for these stations to adhere closely to their allotted frequency in order to prevent mutual interference. This requirement has led to the embodiment of crystal control in the latest Marconi wireless beacons, the first of which (of 250 W aerial power) is to be installed at Cabo Vilano, North Eastern Spain. The new beacon provides for the transmission of interrupted continuous wave signals on any wavelength between 950 and 1,050 metres, the crystal control being of the low-temperature frequency coefficient type.

Marconi automatic wireless beacon of the crystal controlled type undergoing final tests at the company's Chelmsford works before shipment to Spain

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberdeen.—July 18th. County Council. Electrical engineering works at Police Station, New Pitsligo. Jenkins & Murr, architects, 16, Bridge Street.

Australia.—MELBOURNE.—Posts and Telegraphs Department. August 6th. Telephone switchboard cords. (A.Y. 13142.)* Telephone plugs and sleeves. (A.Y. 13141.)* Telephone instrument cords. (A.Y. 13143.)*

Blackpool.—July 29th. Corporation. Stores. (July 5th.)

Carlisle.—City Council. Electric installations at 214 houses on the Raffles Newtown and Currock estates. P. Dalton, city engineer, 18, Fisher Street.

Clitheroe.—July 15th. Electricity Department. P.i. cable. (June 28th.)
July 19th. Ten miles of copper conductor. (July 5th.)

Copenhagen.—August 13th. Lighting Department. Boiler plant, &c. (G.Y. 15280.)*

Croydon.—July 31st. Electricity Department. 30,000-kW turbo-alternator, complete with ancillary plant. (July 5th.)

Glasgow.—Public Assistance Department. Grates and ranges and automatic board for Post Office telephone system at Lennox Mental Institution. (July 5th.)
August 3rd. Corporation. Electrically operated passenger and goods lift at Art Galleries, Kelvingrove. Office of Public Works, City Chambers (Room 81).

Halifax.—July 16th. Electric lighting installation at Copley school. D. T. Lloyd Jones, Borough engineer, Crossley Street (deposit £1 1s.).

Horsham.—July 16th. U.D.C. Electric wiring in the Town Hall. C. G. Atkinson, Council's surveyor, Council Offices, Horsham Park (deposit £2 2s.).

Hull.—July 17th. City Engineer's Department. Electrically driven pump. (July 5th.)

Irish Free State.—ATHLONE.—July 16th. U.D.C. Electric motors and centrifugal pumps. P. H. McCarthy, 26, Lower Leeson Street, Dublin (deposit £3 3s.).
MONAGHAN.—July 31st. Mental Hospital Committee. Electric lighting at the Institution. Resident medical superintendent (deposit £5 5s.).

Kirkcudbright.—July 15th. County Council. Electric lighting installation at Police Station, Dalry. County architect, County Offices.

Leeds.—July 16th. Works and Supplies Department. Electric lighting at various schools. F. Broadbent, architect and executive officer, Civic Hall.

London.—BETHNAL GREEN.—July 16th. Borough Council. Rising mains and wiring and fitting of tenement dwellings, and installation of wiring and apparatus in dwelling houses, including tenement dwellings. (July 5th.)
STOKE NEWINGTON.—Electricity Department. Battery, two transformer kiosks and d.c. prepayment meters. (See this issue.)

Morley.—July 15th. Renewal of electric lighting installation at Morley Grammar School. A. Crosby, clerk to the governors, Town Hall.

New Zealand.—DUNEDIN.—September 25th. Corporation. Auto-synchronous electric motor and reduction gear. (A.Y. 13129.)*
WELLINGTON.—Public Works Tenders Board. October 8th. 1,500-kVA transformer. (A.Y. 13167.)*

Northern Ireland.—BELFAST.—August 3rd. Electricity Department. Indoor type armour-clad switchgear and extensions to coal-handling plant and chlorinating plant at the Harbour power station. (See this issue.)

Salford.—July 16th. Corporation. Three 6,600-V, 350,000-kVA oil circuit-breakers. (July 5th.)

Solihull and Meriden.—July 29th. Joint Hospital Committee. Electric wiring, &c., for lighting and power at the Joint Isolation Hospital, Catherine-de-Barnes. The Committee, 12, Priory Street, Coventry (deposit £1 1s.).

Solihull.—July 15th. U.D.C. Wiring for electric lighting of twenty-two houses at Illshaw Heath. R. Dunn, engineer and surveyor, Council Offices.

South Africa.—PRETORIA.—Union Tenders and Supplies Board. July 19th. L.c. telephone cable. (A.Y. 13162.)* V.i.r. l.c. telegraph cable, wire and bus-bars. (A.Y. 13159.)*
July 26th. Copper wire and telephone cable. (A.Y. 13161.)*
August 9th. Telephone and telegraph line material. (T.Y. 5025.)*

South Shields.—Town Council. Electrical work at the new High School for Boys. G. R. Smith, architect, 3, Winchester Street.

Warwickshire.—July 25th. The County Council invites applications from heating and electrical engineers to be included in its official list of tenderers for work. (See this issue.)

Wimbledon.—July 17th. Town Council. Electrical thermal-storage heating and domestic hot-water supply system for new offices and stores, Durnsford Road, S.W.19. Chief engineer, Electricity Works, Durnsford Road.

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Australia.—COMMONWEALTH.—P.M.G.'s Department. Accepted. Underground cable.—British Insulated Cables, Ltd. Telephones and dials.—British General Electric Co., Ltd. (£52,498); Ericsson Telephone Manufacturing Co. (£18,998).—*Tenders.*

Carlisle.—Housing Committee. Accepted. Wiring 220 Council houses.—Hall & Stinson, Ltd.

Deptford.—Housing Committee. Accepted. Wiring houses on the Brockley estate (£490).—General Electric Maintenance Co.

Glasgow.—Clyde Navigation Trust. Accepted. Electric coaling crane at North Quay, Queen's Dock (£7,650).—Sir William Arrol & Co., Ltd.

Hull.—Telephones Committee. Accepted. Private automatic branch exchange (£886).—Standard Telephones & Cables, Ltd.

Ilford.—Electricity Committee. Accepted. Reblading turbo-alternator (£190).—Fraser & Chalmers, Ltd. Switch cubicle (£179).—Crompton Parkinson, Ltd.

Lincoln.—City Council. Accepted. 13-panel 250,000-kVA metal-clad control board.—A. Reyrolle & Co., Ltd.

Liverpool.—Electric Power & Lighting Committee. Accepted. Supplies for two years: 6,000-V and 11,000-V plant for static sub-stations.—Ferguson Pailin, Ltd. Type "B" bus-bar switchboards for static sub-stations (£70 each).—J. G. Statter & Co., Ltd.
Recommended. Supplies for two years of type "A" single bus-bar switchboards (£143 each) and type "A" and "B" double bus-bar switchboards (£261 each).—Crompton Parkinson, Ltd.

London.—L.C.C. Housing and Public Health Committee. Wiring and necessary fittings for electric lighting, &c., in blocks 19 to 36 of dwellings on the Honor Oak Estate.—A. Meckhonik (accepted), £7,039; Marryat & Place, £7,421; Jacob, White & Co., £7,460; Holliday, Hall & Stinson, £7,615; Henfrey Electrical Installations, £7,725; G. E. Taylor & Co., £8,179; Read & Partners, £8,299; Springvale Electrical Co., £8,308; Wiring, Ltd., £8,361; Pinching & Walton, £8,575; Samuel Reed & Sons, £8,844; W. H. Gaze & Sons, £8,889; Electrical Installations, £9,123; Cox-Walkers, £9,638; A. Higginbotham & Sons, £9,980; John Hunter & Co., £10,267; South Metropolitan E.L. & P. Co., £10,578; Francis Polden & Co., £10,691; Ryland's Electrical Co., £11,527; H. J. Cash & Co., £11,740; Harland & Wolff, £11,826; Kershaws (Electrical Engineers), £13,318. The chief engineer's comparable estimate was £8,234.
EAST HAM.—Electricity Committee. Accepted. Switchboard (£615).—Switchgear & Cowans, Ltd.

Middlesbrough.—Town Council. Accepted. 15-panel metal-clad switchboard (£1,740).—English Electric Co., Ltd.

Scarborough.—Town Council. Accepted. Electrical installations in houses: (208) Bowie Electrical Services, Ltd.; (110) Watson & O'Connor.

South Shields.—Town Council. Accepted. Electrical installation in connection with the reconstruction of the Stanhope Road Senior school (£574).—A. J. Wares, Ltd.
Transport Committee. Accepted. Trolley wire.—British Insulated Cables, Ltd.

Surrey.—C.C. Assistance Committee. Accepted. Internal telephone system at Richmond Institution (£457).—Shipton Automatic Telephone System, Ltd.

Watford.—Electricity Committee. Accepted. Boiler, super heater, economiser, chimney, stoker, &c., for power station (£24,680).—John Thompson Water Tube Boilers, Ltd.

The Public Lighting Conference

THE twelfth annual conference of the Association of Public Lighting Engineers is to be held in London from September 9th to 12th. The provisional programme is as follows:—

September 9th.—Afternoon Council meeting and annual general meeting, with evening reception and dance—all at the Hotel Metropole.

September 10th.—Conference to be opened in the morning by the Parliamentary Secretary to the Ministry of Transport. Presidential address by Mr. A. M. Bell (public lighting superintendent, Tottenham and District Gas Co) and paper on directional lighting by gas lamps. After luncheon there will be an afternoon paper on developments in electric lighting in London by Mr. W. J. Allbright (South Met. E.L. & P. Co., Ltd.). In the evening there will be an inspection of the "lights o' London" by motor coaches.

September 11th.—A morning paper on costs and statistics of street lighting by Mr. R. Parker (Sheffield Public Lighting Department) will be followed by another on an analysis of modern views on street lighting and their relation to visibility. After luncheon an afternoon paper on developments in public lighting in Germany will be presented by Dr. Ing. Adolph (Berlin Light & Power Co. ("Bewag")). The Association's dinner and dance will be held in the evening.

September 12th.—A morning paper on the importance of kinematical factors in roadway illumination by Messrs. R. Maxted and L. J. Davies (B.T.H. Research Department) will be followed by an afternoon steamer visit to the Port of London.

Notes

Generation of Electricity in June

The official returns rendered to the Electricity Commissioners show that 1,147 million kWh of electricity was generated by authorised undertakers in Great Britain during June, as compared with the revised figure of 1,049 million kWh in the corresponding month of 1934, representing an increase of 98 million kWh, or 9.3 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holidays) was twenty-four, as against twenty-six last year.

During the first six months of 1935 up to the end of June the total amount of electricity generated by authorised undertakers was 8,502 million kWh, as compared with the revised figure of 7,632 million kWh for the corresponding period of 1934, representing an increase of 870 million kWh, or 11.4 per cent.

	1934. kWh. (millions).	1935. kWh. (millions).	Increase per cent.
January	1,536	1,714	11.6
February	1,343	1,478	10.0
March	1,391	1,507	8.3
April	1,188	1,330	11.9
May	1,125	1,326	17.9
June	1,049	1,147	9.3

An Unsolicited Testimonial

Commenting on a recent article by Professor W. A. Bone, *Nature* says that the author is naturally proud of the progress made by the gas industry during the past hundred years. He points out that the electrical industry is only fifty years old and has the attractiveness and self-confidence of youth, and so is apt to impress uncritical minds with its superiority, *Nature* agrees that a London gas consumer buys as much potential heat for 8.6d. as would cost an electricity consumer nearly half a crown at 1d. per unit. "On the other hand, every bit of the electric heat can be utilised, whilst an appreciable fraction of the gas heat passes up the chimney. Electricians are well aware of the relative costs of gas and electricity for heating, and where economy is the primary consideration, water heating by electricity is only advisable in certain cases. We do not agree with Prof. Bone that a chimney is necessary for the suitable ventilation of bed- and living-rooms. Many systems for ventilating rooms have been devised. Possibly in a few years' time chimneys will be considered relics of barbarism, and roof gardens will add to the amenity of life. In London, many consumers now get their electricity at 0.5d. per unit and are delighted with their electric heaters and cookers, even although they have previously had extensive experience of gas rings and fires."

Anti-Dazzle Road Regulations

The Ministry of Transport issued draft regulations last week (to take effect from April 19th, 1936) relating to the headlights of motor vehicles. They provide that all headlights containing electric lamps exceeding 6 W in power shall be permanently deflected or capable of deflection to such an extent that they will be unable to dazzle any person standing at more than 25 ft. from them in the same horizontal plane and whose eye-level is not less than 3.5 ft. above that plane. It is also provided that lamps of a greater power than 6 W shall not be left burning while a vehicle is stationary.

Students' Sports Events

River sports are to be held on the Hampton Wick reach to-morrow (Saturday), when I.E.E. students and graduates will take part in rowing and swimming events, apart from informal competitions. Boats will be available at special rates from Burgoine's boathouse, adjoining Kingston Bridge, at 2.30 p.m.

On June 27th, in the preliminary tennis events, the "Electricals" were the victors over the "Mechanicals." On the same day the "Mechanicals" lost at cricket, so that the "Civils" will meet the "Electricals" in the finals of both events on July 20th on the Faraday House ground at West Molesey, when Mr. H. T. Young will present his trophy. On June 28th teams representing the three bodies competed at shooting, the I.E.E. team being successful. The venue of the golf events will be announced in due course.

The Benevolent Ball

The annual ball of the Electrical Industries Benevolent Association will be held on November 26th at the Grosvenor Hotel. It would be helpful if readers would book the date in their diaries before they think more about their holidays.

The A.M.E.E. Convention

The annual Convention of the Association of Mining Electrical Engineers will be held in Nottingham from July 17th to 20th. The programme, which has been arranged by a joint committee of the Warwickshire and South Staffs and Midland branches, includes visits to the works of the following: British Thomson-Houston (Rugby) on Thursday; the Stanton Ironworks Co. and Ericsson Telephones, Ltd. (Beeston), on Friday; and the Buxton Mines Research Station, where an explosion will be staged, on Saturday morning. The Convention will open on Wednesday next at 8 p.m. with a civic reception by the Lord Mayor of Nottingham. On the next evening will be the coal-owners' dinner and dance, and on Friday the Association's annual dinner and dance. The Convention headquarters will be the Victoria Station Hotel, Nottingham. Inquiries should be addressed to Mr. C. A. Bosworth, 22, Church Drive, Carrington, Nottingham.

Further E.A.W. Branches

Another branch of the Electrical Association for Women was inaugurated at the meeting held in the Corporation electricity showrooms at Coventry on July 1st, under the chairmanship of Coun. W. H. Malcolm, chairman of the Electricity Committee. The Mayor, Ald. T. E. Friswell, was present, and Mrs. Pender Chalmers stated that the E.A.W. now had a membership of 7,000 and fifty-seven branches. Miss Hailey, hon. secretary, announced tentative arrangements for a course of lectures and a visit to the Coventry works of the B.T.H. Co. on July 9th. Other speakers included Mr. W. J. Marston, city electrical engineer, and Mr. F. H. Harrod, director of education, who referred to the extending use of electrical appliances in all the domestic science centres of Coventry schools. Mrs. Miller is president of the new branch.

At a meeting in the Cleethorpes Urban District Council House last week another branch of the Association was formed, with Ald. Mrs. A. Croft Baker as president and Mrs. B. S. Ford as hon. secretary. Miss C. Haslett addressed the gathering.

Rural Electrification Costs

The *Electrical World* of June 22nd reproduces what is termed a "rural electrification balance sheet" prepared by the National Power Survey to show the amount of potential business which exists in the electrification of United States farms. It is shown that there are 6,288,648 farms in the States and 993,954 of them have electrical services, leaving 5,294,694 unserved. It is estimated that the cost of installing service facilities for these would amount to $1,862,000,000, while they would need wiring and equipment to a value of $11,865,000,000, a total of $13,727,000,000. Consideration is given to the cost per annum to the farmer of the equipment and energy. Paying off the investment and using 760 kWh per year he would have to meet a bill of $289, or using 7,300 kWh per year one of $611. Without repayment of investment the annual costs would be $209 and $386 respectively. The average total income per farm in 1934 was $520.

Radio Interference Suppressors

A useful British Standard Specification has been issued for the components to be used in radio interference-suppression devices. This specification originated in a sub-committee of the I.E.E. Committee appointed to study the subject as a whole, and was completed by the British Standards Institution. The Specification proper deals with the rating, performance and testing of condensers, inductors and resistors used in the construction of interference suppressors, but one of the most instructive sections is the appendix in which are given numerous diagrams of connections and schedules of component values, which have been found satisfactory in practice for the suppression of interference from various types of machines and appliances. Copies of the Specification (No. 613-1935) may be obtained from the Publications Department, British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Next Year's Transport Congress

At the invitation of the Birmingham and District Section it has been decided to hold the next congress of the Institute of Transport at Birmingham from May 20th to 23rd, 1936.

Educational

The Department of Engineering, Royal Technical College, Glasgow, announces that the 1935-36 session commences on September 24th. Particulars are given in our classified advertisement section. This section also contains information regarding the Applied Science Departments of the University College of Swansea, which offer entrance scholarships.

Appointments Vacant

Assistant technical engineer for the Belfast Electricity Department.

Electrical engineer for the Shorncliffe Military Area, Royal Engineers.

Principal technical assistants at the new Fulham power station.

Rentals clerk for the Bath Electricity Department.

Assistant master for electrical engineering and mathematics at the L.C.C. Paddington Technical Institute (salary £276-£15-£528).

Inspector of machinery for the Mines Department of the Gold Coast Government.

Lady showroom attendant and demonstrator for the Mirfield U.D.C.

(See our classified advertisements.)

Makers' Names Wanted

AEROFROTH pump for aquariums.
HYDROFROTH water pump.
PROPELAIR electrical goods.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. James McDermott, who has been deputy chief engineer of the New Zealand Post and Telegraph Department since 1932, was recently appointed chief telegraph engineer.

Mr. C. R. Cooper

Mr. C. R. Cooper, B.Sc., the author of "Revising a Tariff" (page 45), served his apprenticeship in the Diesel engine workshops of Messrs. Harland and Wolff, Ltd. He was subsequently appointed mains draughtsman in the Electricity Department, Glasgow, and later he was for five years a factory engineer and manager in British North Borneo. He is at present technical assistant in the Statistical Department of the North-Eastern Electric Supply Co., Ltd., which position he has occupied since 1930. Mr. Cooper is an associate member of the Institution of Electrical Engineers and a member of the Association of Costs and Works Accountants.

Mr. William Redshaw, electrical engineer at Thornley Colliery (Co. Durham) who has been appointed to a similar post with the Crook Urban Council, was recently presented with an inscribed stop watch by Mr. W. Atkin, colliery engineer, on behalf of the management and officials of the Colliery.

Mr. C. G. Whibley, B.E., has been appointed chief engineer to the Electric Light & Power Corporation, Ltd., Sydney, N.S.W. According to the Sydney *Electrical & Radio Trader*, Mr. Whibley made a special study of electricity distribution at the Trafford Park works of the Metropolitan-Vickers Co., and also served as assistant engineer to Messrs. A. Reyrolle & Co., Hebburn-on-Tyne. Since he returned to Australia, and prior to joining the Electric Light & Power Corporation, he was with Messrs. Noyes Bros. (Sydney), Ltd.

Mr. H. H. Hywood, Cinderford, Glos, has discontinued business and has been appointed sales engineer to the Alton Battery Co., Ltd., Alton, Hants, in the South-West of England and South Wales.

Mr. H. R. Carr White, a member of the staff of the Cornwall Electric Power Co., was married on July 4th to Miss Kahnia Thomas.

The engagement is announced of **Mr. Denis Ziani de Ferranti,** son of the late Dr. S. Z. de Ferranti, and of Mrs. G. Z. de Ferranti, of Wood Green Farm, Upper Basildon, Pangbourne, Berks, to Germaine de Courcy Moore, only daughter of Sir Harold de Courcy Moore, of Tudor Court, Cobham, Surrey. Mr. Denis de Ferranti was elected a director of Ferranti, Ltd., in the year 1933. One of his special interests for some years has been the meter department of the company.

Mr. R. L. Graseby, whose father, Mr. R. C. Graseby, is managing director of Venner Time Switches, Ltd., has become engaged to Miss Marjorie Sharman, of Cobham, Surrey.

Sir Archibald Page, chairman of the Central Electricity Board, and **Mr. F. H. Williams,** manager of the Galloway Power Co., took part in the recent annual inspection of the power stations in the Ayrshire Electricity Board's area.

Members of the Ayrshire Electricity Board at the back of the new mobile electricity showroom (see page 55)

Mr. H. W. Price, professor of electrical engineering at Toronto University, has been awarded the McCharles prize for his invention of an automatic control apparatus for generating stations and power transmission networks. This prize is awarded to Canadians for important scientific discoveries, and Prof. Price is the fifth winner. The invention is being used in the Queenston generating station of the Ontario Hydro-Electric Power Commission, on the Niagara River. It consists of a centrifugal governor combined with a device to detect any departure from the desired speed of an electrical or mechanical system.

Mr. H. C. Lee, who is in business as an electrical contractor at Cheadle Hulme, near Stockport, was married at Wilmslow on July 4th to Miss Eva Henshall.

Mr. A. Beer, of the staff of the Newport Corporation Electricity Department, was married last week to Miss R. G. Manning, and was presented by his colleagues with an electric clock.

Mr. R. E. Hattersby has resigned his directorship of Lancashire Dynamo & Crypto, Ltd.

Messrs. A. A. Douglas and C. Gane have been appointed additional directors of the Southern Areas Electric Corporation, Ltd.

Sir Robert Hadfield, F.R.S., has been awarded the Royal Society of Arts' Albert Medal for 1935 for his researches in metallurgy and his services to the steel industry. The presentation was made by the Duke of Connaught, president of the Society, on Monday.

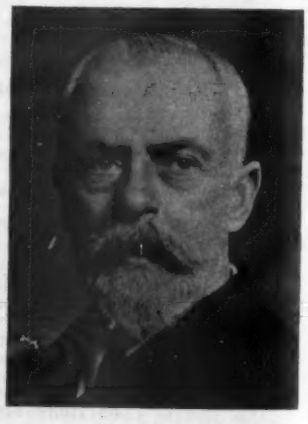
Mr. W. B. G. Collis, assistant engineer with the Metropolitan-Vickers Electrical Co., Ltd., was married at Lincoln Cathedral, on June 29th, to Miss Annie Brunyate. He was presented with a dinner service by the staff of the traction department.

Mr. B. Welbourn, chief engineer of British Insulated Cables, Ltd., has been presented by his colleagues with the robes for the honorary degree of Master of Engineering which is to be conferred upon him by the University of Liverpool.

Mr. S. W. Lumb, assistant secretary to Siemens Electric Lamps & Supplies, Ltd., has been appointed to succeed **Mr. W. Wheeler** as secretary of Siemens Bros., & Co., Ltd. Mr. Wheeler, who retired on June 30th, had been in the company's service for 50 years, and was secretary for 25 years.

Obituary

Lord Ampthill.—We regret to record the death of Lord Ampthill, at the age of sixty-six years. He died in London on Sunday last from pneumonia. Lord Ampthill, who had a career of great distinction in politics at home and overseas, notably in India, was one of the early presidents of the British Electrical and Allied Manufacturers' Association, and at the time of his death he was a director of a number of non-electrical companies.



[Elliott & Fry.

The late Lord Ampthill

Sir Hugh Reid.—The death occurred suddenly on Sunday at Glasgow, at the age of seventy-five years, of Sir Hugh Reid, Bt., M.Inst.C.E., chairman and managing director of the North British Locomotive Co., Ltd. Many of our readers will remember him as the joint inventor of the Reid-Ramsay turbo-electric locomotive which was built at the North British works where he had received his training; the combination aroused a good deal of interest, both during its construction and when it was put into experimental service. Sir Hugh will be remembered by other readers as the chairman of the Machine Section of the Glasgow International Exhibition of 1901, where there was one of the finest exhibitions of engineering manufactures, prior to Wembley in 1924, ever brought together in the British Isles.

Sir George Alexander Touche, Bt., who was a director of a number of companies, including the Atlas Electric & General Trust, Ltd., died at Dorking on Sunday, aged seventy-four.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Dowsett & Co., Ltd.—Private company. Registered June 28th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless and television receivers and instruments, &c. The subscribers are: G. Hornsby, 32, Brampton Road, Hampden Park, Eastbourne, and W. J. Dowsett, 48, Grove Road, Eastbourne. Secretary: G. Hornsby.

Mottershead & Deason, Ltd.—Private company. Registered June 29th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electricians, wireless and mechanical engineers, &c. The directors are: E. G. Mottershead, 44, Stonehouse Road, Sutton Coldfield, and R. Deason, 223, Charles Road, Small Heath, Birmingham. Registered office: 127, High Street, Erdington, Birmingham.

Clo-Dial (British) Clocks, Ltd.—Private company. Registered July 1st. Capital, £5,000 in 5s. shares. Objects: To carry on the business of clock, sign and display makers, electricians, manufacturers of electrical, mechanical, automatic, illuminating and other devices, &c. Secretary: F. C. Faithfull, 245, Marylebone Road, London, W. Registered office: Mitre House. 177, Regent Street, London, W.1.

Owen Power Plant, Ltd.—Private company. Registered July 3rd. Capital, £21,000 in 20,000 6 per cent. non-cumulative preference shares of £1 each and 20,000 ordinary shares of 1s. each. Objects: To carry on the business of engineers, founders, manufacturers of and dealers in power and other plant, furnace designers and contractors, &c. The first directors are: W. H. Owen (life director), and others to be appointed. Solicitors: J. D. Langton and Passmore, 16, Tokenhouse Yard, London, E.C.

Scott, Johnson & Co., Ltd.—Private company. Registered July 1st. Capital, £500 in £1 shares. Objects: To carry on the business of mechanical, civil and electrical engineers, manufacturers of machinery, implements, tools, hardware goods, &c. The first directors are: T. A. Scott, Johnson, B.Sc. (Eng.), 1, Sheffield Terrace, London, W.8, and two others. Solicitors: W. Sturges & Co., Caxton House, Westminster, London, S.W.1. Registered office: 22, Old Queen Street, Westminster, S.W.1.

Babbs (Manchester), Ltd.—Private company. Registered July 3rd. Capital, £90 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in all kinds of electric and non-electric scrubbing and mopping machines, &c. The first directors are: A. J. Babbs (permanent managing director), 28, Albert Grove, Longsight, Manchester, and two others. Solicitors: Doughty & Co., 76, King Street, Stretford. Registered office: 28, Albert Grove, Longsight, Manchester.

United Rentals, Ltd.—Private company. Registered July 1st. Capital, £1,000 in £1 shares. Objects: To carry on the business of makers of and dealers in receivers or other apparatus for the reception of sound or vision, to purchase the benefit of hire-purchase agreements, &c. The first directors are: Sir Thomas A. Polson and two others. Solicitors: Bartlett & Gluckstein, 199, Piccadilly, W.1.

Broadcast Relay Service (Malta), Ltd.—Private company. Registered June 26th. Capital, £5,000 in 1s. shares. Objects: To maintain, develop and expand services for the relaying of wireless and radio programmes and matter in the Islands of Malta and Gozo, and elsewhere. The directors are: Sir Herbert B. Grotrian, Bt., "Knolls," Leighton Buzzard, Beds, and two others. Solicitors: Forster & Darling, Darlington. Registered office: Bush House, Aldwych, London, W.C.2.

A. W. Grantham, Ltd.—Private company. Registered July 4th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a radio and electrical engineer and dealer now carried on at 39, Ruskin Road, Carshalton, Surrey, as A. W. Grantham. The permanent directors are: A. W. Grantham, 30, High Street, Carshalton, and three others. Qualification, £100 shares. Solicitors: F. Miller Parris, 17, Katharine Street, Croydon.

London Zinc Mills (1935), Ltd.—Private company. Capital, £10,000 in £1 shares. Objects: To carry on the business of engineers, zinc manufacturers, coppersmiths, smelters, founders, consulting, electrical, water supply, mechanical and general engineers, manufacturers of and dealers in zinc, by-products of zinc, wires, cables and other articles and accessories in the zinc, electrical and allied trades, makers of bar fittings and all descriptions of ship and electrical fittings, &c. Solicitors: Slaughter & May, 18, Austin Friars, London, E.C.2.

Leroy's Radio & Television Service, Ltd.—Private company. Registered June 26th. Capital, £1,000 in £1 shares. Objects: To carry on the business of wireless and television engineers, manufacturers of and dealers in wireless and television apparatus, gramophones, &c. The first directors are: L. A. Leroy and Mrs. Nora M. Leroy, both of 7, Upperton Gardens, Eastbourne.

Keates & Co. (Radio), Ltd.—Private company. Registered June 26th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in wireless sets, gramophones, cinematograph machines, &c. The directors are: K. A. Wilen, 57, Finchley Lane, Hendon, N.W.4, and J. A. Wilen, 57, Finchley Lane, London, N.W.4. Registered office: 91/93, Bishopsgate, E.C.2.

Tom Wright (Radio), Ltd.—Private company. Registered June 24th. Capital, £1,500 in £1 shares. Objects: To acquire the business of a wireless and electrical engineer and wireless retailer carried on by Thomas A. O. Wright, at 557, Foleshill Road, Coventry. The first directors are: T. A. O. Wright, 78, St. Paul's Road, Coventry, and B. Wright, Warneford General Hospital, Leamington Spa. Registered office: 557, Foleshill Road, Coventry.

Law & Burns, Ltd.—Private company. Registered June 12th. Capital, £500 in £1 shares. Objects: To carry on the business of electric light and power engineers and contractors, radio engineers, &c. The first directors are: C. H. Law, 19, Maple Grove, Cleadon, South Shields; and J. Burns, 69, Marine Approach, South Shields.

Electra (Birmingham 1935), Ltd.—Private company. Registered June 11th. Capital, £500 in £1 shares. Objects: To carry on business as manufacturers and repairers of and dealers in dynamos, motors, armatures, magnetos, batteries, conductors, insulators, transformers, &c. The subscribers are: S. A. Pettifer and R. H. E. Sloan, both of 28, Lincoln's Inn Fields, W.C.2. Acting secretary: S. A. Pettifer. Registered office: 28, Lincoln's Inn Fields, W.C.2.

Central Radio & Electrical Co. (Stockport), Ltd.—Private company. Registered July 5th. Capital, £1,000 in £1 shares (350 5 per cent. cumulative preference and 650 ordinary). Objects: To acquire the business of a radio and electrical dealer now carried on by F. G. Teggin, at 98, Princes Street, Stockport, as the Central Radio & Electrical Co. The permanent directors are: J. H. Bainbridge, 14, Hawthorne Road, Hollinwood, Oldham, and F. G. Teggin, 76, Framingham Road, Brooklands, Sale. Solicitor: C. J. Booth and Middleton, Oldham.

Morris & Co. (Radio) Ltd.—Private company. Registered June 15th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless and television sets and apparatus, etc. The subscribers are: D. A. P. August, 170, Bishopsgate, E.C.2, and R. J. Cracknell, Holly Brow, Bouverie Road, Chipstead. Secretary: D. A. P. August.

Floorcrete Conduit Fittings Manufacturing Co., Ltd.—Private company. Registered July 5th. Capital, £2,000 in £1 shares. Objects: To carry on the business of electrical manufacturers and suppliers of materials of every description used in the electrical trade, &c. The directors are: J. E. S. E. Honor, 20, Waldemar Avenue, W. Ealing, London, W., and C. W. H. Honor, 10, Liverpool Road, Ealing, W.5.

B. & E. Battery Co., Ltd.—Private company. Registered July 6th. Capital, £1,000 in £1 shares. Objects: To acquire the business of manufacturers of and dealers in wireless h.t. batteries and accumulators carried on by M. W. Bagnall and J. W. Edminson, at Forsyth Bridge Works, Forsyth Road, Jesmond, Newcastle-on-Tyne. The directors are: M. W. Bagnall, 50, Mayfair Road, West Jesmond, Newcastle-on-Tyne, and three others. Solicitors: Griffith & Co., 12/14, Royal Arcade, Newcastle-on-Tyne. Registered office: Forsyth Bridge Works, Forsyth Road, Jesmond.

R. E. West Electrical, Ltd.—Private company. Registered July 6th. Capital, £500 in £1 shares. Objects: To acquire the business of an electrical engineer now carried on by R. E. E. West, of 33, Grosvenor Crescent, Kingsbury, Middlesex. The directors are: R. E. E. West, 33, Grosvenor Crescent, Kingsbury, and H. W. Copping, 68, Keslake Road, Kilburn, N.W.8. Registered office: 33, Grosvenor Crescent, Kingsbury.

Williamson's Electrical Co., Ltd.—Private company. Registered July 6th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, &c. The directors are: F. M. Williamson, 34, Woodwarde Road, East Dulwich, London, S.E.22, and two others. Solicitors: Ingram, Burton & Co., 45, Fore Street, E.C. Registered office: 184, Peckham Rye, London, S.E.22.

Whitehead Switchgear, Ltd.—Private company. Registered July 5th. Capital, £10,000 in 25,000 ordinary shares of 2s., and 7,500 5 per cent. cumulative preference shares of £1. Objects: To acquire any patents, patent rights, brevets d'invention, licences, protections and concessions, &c. The subscribers are: G. E. Whitehead, Braeside, Rhiwbina Hill, Cardiff, and E. H. Sainsbury, 3, Dumfries Place, Cardiff. Solicitors: C. James Hardwicke & Co., 3, Dumfries Place, Queen Street, Cardiff.

Abar Electrical Co., Ltd.—Private company. Registered July 5th. Capital, £300 in £1 shares. Objects: To acquire the business of an electrical and mechanical installation engineer carried on by Aaron Barnett, at 181, Hammersmith Road, London, W.6, as Abar Electrical Co. The permanent directors are: E. St. C. Thompson, 263, Valley Road, S.W.16, and Aaron Barnett (managing director), 181, Hammersmith Road, W.6. Registered office: 181, Hammersmith Road, W.6.

A. J. Morris, Ltd.—Private company. Registered June 27th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, dealers in and makers of electrical fittings, &c. The directors are: H. M. Smith, address not stated, and three others. Solicitors: R. Hamilton, Twyford & Co., 4, Regent Street, S.W.1.

Radium Ray, Ltd.—Private company. Registered July 6th. Capital, £100 in £1 shares. Objects: To acquire the business carried on by J. Ismay and G. S. Rate at Roden Street Works, Ilford, as the Radiumray Company, and to carry on the business of manufacturers of and dealers in electric lamps emitting rays from radium salts and used for health-giving purposes, &c. The subscribers are: J. Ismay, Roden Street Works, Ilford, and T. S. Cornell, 9, Wilson Road, Southend-on-Sea.

John Baker & Son (Electrical), Ltd.—Private company. Registered June 7th. Capital, £300 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in wireless sets and apparatus of all kinds, gramophones, &c. The first directors are: M. A. Baker, A. E. Baker and E. F. Baker, all of 30, Clifton Road, Maida Vale, W.9. Registered office: 30, Clifton Road, Maida Vale, W.9.

Returns of Electrical Companies

Lancashire Electric Light & Power Co., Ltd.—The nominal capital has been increased by the addition of £400,000 in 400,000 ordinary shares of £1, beyond the registered capital of £3,171,415.

Lancashire Telephone Systems, Ltd.—Capital, £10,000 in 5,000 8 per cent. participating preference and 5,000 ordinary shares of £1. Return dated January 14th, 1935. 700 preference and 5,000 ordinary shares taken up. £5,080 paid on 700 preference and 4,380 ordinary shares, £620 considered as paid on 620 ordinary shares. Mortgages and charges: £3,150.

M. W. Woods, Ltd.—The nominal capital has been increased by the addition of £12,900 beyond the registered capital of £12,100. The additional capital is divided into 4,000 preference shares of £1 and 89,000 ordinary shares of 2s. each.

Simkiss & Knighton, Ltd.—Memorandum of deposit dated June 11th, 1935, charged on California Engineering Works and 111, Parliament Street, Derby, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Amcolite, Ltd.—Particulars filed of £9,000 debentures, authorised June 20th, 1935, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Electric Welded Chain Co., Ltd.—Debenture dated June 24th, 1935, to secure £1,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: P. J. Darby, Green Royde, Pedmore, Stourbridge.

W. T. Henley's Telegraph Works Co., Ltd.—Satisfaction to the extent of £150,000 (being whole amount issued, the remaining £150,000 having been cancelled) on June 1st, 1935, of trust deed dated November 24th, 1905, and supplemental deed dated December 31st, 1918, and registered December 13th, 1905, and January 16th, 1919, respectively, securing first mortgage debenture stock.

Sevenoaks & District Electricity Co., Ltd.—The nominal capital has been increased by the addition of £200,000 in £1 ordinary shares beyond the registered capital of £200,000.

Woodstock Power Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated January 4th, 1935. 3,510 shares taken up. £3,510 paid. Mortgages and charges: £2,300.

H. G. Weaver, Ltd.—H. K. Campbell, of 9, Denmark Street, Bristol, was appointed receiver on June 24th, 1935, under powers contained in instrument dated August 31st, 1934.

Summit Electrical Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1934 (filed March 26th, 1935). 100 shares taken up. £100 paid. Mortgages and charges nil.

Electric Supply Corporation, Ltd.—Capital, £750,000 in 431,262 ordinary, 250,000 preference, and 68,738 unissued shares of £1 each. Return dated May 1st, 1935. All the ordinary and preference shares taken up. £529,000 paid on 279,000 ordinary and 250,000 preference shares, £152,262 considered as paid on 152,262 ordinary shares. Mortgages and charges nil.

Architectural Lighting, Ltd.—Mortgage dated May 31st, 1935, to secure all moneys which the chargee may be called upon to pay under a guarantee to Lloyds Bank, Ltd., not exceeding £600. Property charged: Certain book debts and firm orders. Holder: Viscount Long of Wraxall, 16, Gloucester Place, London, W.1.

Wirral Electrical, Ltd.—W. A. Airey, of 8, Victoria Street, Liverpool, was appointed receiver on June 24th, 1935, under powers contained in debentures dated January 23rd and February 27th, 1935.

Calor, Ltd.—G. C. Darley, of 1 and 3, Harrington Street, Liverpool, ceased to act as receiver and/or manager on June 28th, 1935.

West Cumberland Relay Services, Ltd.—Mortgage on 49, Lowther Street, Whitehaven, dated May 28th, 1935, to secure £800. Holders: Workington and West Cumberland Permanent Benefit Building Society.

Broadcast Relay Service, Ltd.—The nominal capital has been increased by the addition of £100,000 beyond the registered capital of £100,000. The additional capital is divided into 2,000,000 ordinary shares of 1s. each.

Cricklewood Wholesale Electric, Ltd.—Capital, £750 in £1 shares. Return dated December 31st, 1934 (filed March 25th, 1935). 520 shares taken up. £520 paid. Mortgages and charges, nil.

Wolverhampton Radio Installation Co., Ltd.—Capital, £1,000 in £1 shares (500 ordinary and 500 preference). Return dated March 12th, 1934 (filed June 5th, 1935). 500 ordinary and 250 preference shares taken up. £740 paid. £10 remains in arrears. Mortgages and charges nil.

General Electric Co., Ltd.—Satisfaction in full on or before March 31st, 1935, of 4½ per cent. first mortgage debenture stock authorised February 27th, 1933, secured by trust deed dated March 28th, 1933, and registered April 12th, 1933. (Notice filed July 1st, 1935.)

Winder, Ltd.—G. Carr, of 20, Newgate Street, E.C., was appointed receiver on June 28th, 1935, under powers contained in debentures dated February 19th, 1925.

Ubique Welding Co., Ltd.—Particulars filed of £10,000 second debentures authorised June 5th, 1935, charged on the company's undertaking and property, present and future, including uncalled capital (subject to mortgages and first debenture), the amount of the present issue being £5,000. Satisfaction to the extent of £1,000 on June 24th, 1935, of second debenture dated January 15th, 1934, and registered January 24th, 1934.

Hartlepools Radio Relay, Ltd.—Capital, £1,000 in £1 shares. Return dated January 11th (filed March 8th), 1935. 101 shares taken up. £100 paid, £1 calls unpaid. Mortgages and charges nil.

Herne Bay Relay Services, Ltd.—Capital, £4,000 in 2,500 preference shares of £1 and 30,000 ordinary shares of 1s. Return dated January 7th, 1935. 2,500 preference and 20,000 ordinary shares taken up. £3,500 paid. Mortgages and charges nil.

Erdington Electrical Co., Ltd.—Capital, £2,000 in £1 shares. Return dated August 3rd, 1934 (filed February 25th, 1935). 1,000 shares taken up. £1,000 paid. Mortgages and charges nil.

J. Wesley Evans & Son, Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1934 (filed March 1st, 1935). All shares taken up. £1,000 paid. Mortgages and charges nil.

Direct Electric Lamp Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1934 (filed April 13th, 1935). Four shares taken up. £4 paid. Mortgages and charges: £1,000.

Feeny & Johnson, Ltd.—Capital, £3,000 in £1 shares. Return dated December 31st, 1934 (filed May 27th, 1935). 2,000 shares taken up. £2,000 paid. Mortgages and charges: £1,250.

Electrical & Auto Products (1931), Ltd.—Capital, £2,000 in 1,000 shares of £1 and 20,000 shares of 1s. Return dated December 31st, 1934 (filed May 18th, 1935). 954 £1 and 20,000 1s. shares taken up. £1,954 paid. Mortgages and charges: £1,000.

South Eastern Radio Supplies, Ltd.—Debenture dated June 11th, 1935, to secure £230, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Mrs. A. H. Veitch, Beach Towers Hotel, Bexhill-on-Sea.

City Notes

Callender's Cable & Construction Co., Ltd., held its annual meeting on July 3rd. Sir J. Fortescue Flannery (chairman), in presenting the report and accounts (ELECTRICAL REVIEW, June 28th, p. 963), said that the trading for the year 1934 had resulted in a profit which permitted a dividend of 15 per cent. to be paid for the sixteenth time, with an increase of £12,141 in the amount carried forward. He pointed out that although certain investments of the company had been disposed of during the year at a profit, credit for these had not been taken into the accounts. The company had directed its scientific investigations to the manufacture of e.h.v. cables and had secured substantial orders for these. Some noteworthy successes had been achieved during recent months in regard to electric cables for ships, which branch was under the special care of Mr. T. O. Callender, jun. The company had secured the order for electric cables for the *Queen Mary* and up to June 1st had already delivered to the ship ten miles of ring main and 400 miles of all types of cable. Orders were also in hand for other new ships for the Mercantile Marine and for the Admiralty. With regard to business generally, the chairman said that the stream of orders remained unabated, and that the relations between the company and its customers never stood higher than to-day. Turning to the subsidiary, the Anchor Cable Co., he reported that the reconditioning of the works at Leigh was commenced during the year and was rapidly nearing completion. The improvements that were being made and the new and up-to-date equipment installed would, he believed, enable the company to meet the change in demand in the nature of the smaller cables required for railway signalling and internal house wiring, while the more rapid manufacture of products would enable them to give prompt delivery. The debenture stock of the subsidiary was paid off last year, as also was that of Callender's Share and Investment Trust. The chairman next referred to the serious loss which they had sustained through the death last November of Mr. Theodor Petersen, assistant managing director. He also recalled that at the beginning of the year the directors had added to the advisory directors Mr. H. Foulds, secretary of the company since 1918, and Mr. E. M. Malek, M.I.E.E., personal assistant to the managing director since 1927. In conclusion, the chairman said he believed they could look forward with great hope that, as well as they had done in 1934, they would do equally well, or perhaps better, in 1935.

Sir Tom Callender, deputy-chairman and managing director, in seconding the resolution for the adoption of the report and accounts, spoke of the increased technical and commercial efficiency in the company's factories and contracts. The Wood Lane Research Department, he said, had been of the greatest possible assistance, but notwithstanding the good results achieved research showed that the limit of development had not been reached, and that it would be possible in future to use materials for higher pressures and also with higher efficiency; this latter being by no means confined to the higher voltages. It was gratifying to know that the company was recognised even by people in Germany, whose leaning towards technical investigation was proverbial, as one of the leading organisations in the world in high-pressure electrical work. Turning to the overseas market Sir Tom Callender said that orders had been received regularly from the West Indies and from Kenya and Tanganyika. Similarly, they had kept in close touch with the extending use of electricity in the small towns of Malay. Extensions were still being carried out by the company in Abadan, Mosul and the Persian Gulf, while some excellent orders had been received from Mesopotamia generally. The representative in China was pushing hard to maintain the position there, where electricity was fast developing but where prices were being "cut to ribbons." In India the Uhl River work had been completed, but this had been followed by a contract for the Madras Government Hydro-Electric Department. This was proceeding rapidly and an additional order had just been received from the same authority which would keep the company occupied in the district well into next year. A concession had been obtained for electricity supply throughout the whole area of Secunderabad. The Ahmedabad Electricity Co., with which Callender's was intimately connected, had largely extended its station and mains, while the Bombay Suburban Co. had continued its excellent progress. In the case of the Okonite-Callender Co. the adverse conditions in the United States had rendered progress very uncertain, but an important railway electrification scheme had recently been carried through and there was reason to anticipate further work of this nature.

Edmundson's Electricity Corporation, Ltd., has called an extraordinary general meeting for July 29th to consider the adoption of new articles of association. The new articles will confer powers on the company, should the board consider it expedient, to make arrangements with the 7 per cent. preference

shareholders for conversion of their shares into 6 per cent. preference shares including power to issue additional 6 per cent. preference shares to them by way of bonus. The present remuneration of the directors is £3,000 per annum, divisible amongst them as they may agree or failing agreement equally, with power to the company in general meeting to increase or reduce such remuneration. Under the new articles the amount or rate per annum of the directors' ordinary remuneration is to be fixed by the company in general meeting, and is to be divisible amongst the directors as they may agree or failing agreement equally, with power to the company to vote extra remuneration to the board or any member of it.

The results of the operations of the group during the month of June, 1935, as compared with the corresponding month of 1934, show an increase of 8 per cent. of units sold.

John Ismay & Sons, Ltd., held its annual meeting on Tuesday, Mr. J. Ismay (chairman and managing director) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, July 5th, page 33), the chairman said that the sales of lamps in the first three months of the present year were more than double those in the corresponding period of last year. Under the new arrangement of being associated with Ismay Industries, Ltd., they would obtain all the component lamp parts from their own factories—either controlled or associated—and that would not only bring down the price of the lamps, but would enable them to turn out a considerably better article, and ultimately to be absolutely independent of any outside sources. He could not see any reason why profits should not go on increasing; the turnover was going up. Since the last meeting they had purchased the greater part of the Sterling works at Dagenham. Ultimately they would move most of their associated companies there, and that would mean a large saving in overhead expenses. With regard to new lines, they were shortly going to try out a new radium-ray lamp which they thought would not only have a good reception, but would prove a very remunerative proposition. It was quite a new idea.

Ismay Industries, Ltd., is paying a special interim dividend of 4 per cent. on the ordinary shares numbered 1 to 1,269,000, principally to recompense shareholders of John Ismay & Sons, Ltd., who have converted their shares. Payable July 24th.

Potters, Ltd., reports a net profit for the year ended March 31st of £13,726 (against a loss of £25,794) which, with £17,860 brought in, makes a total of £31,586 available for disposal. The directors recommend the payment of a year's dividend on the preference shares at the rate of 7½ per cent., less tax. After meeting the interest on the funding certificates and making a payment to the funding certificate redemption fund, there is a balance of £31,586 to carry forward. The report states that the engine department sales show a substantial increase over the preceding year and that export trade is improving. As a result of research work certain new types of engine have been introduced and are expected to have a beneficial effect on the future of the department. Meeting: July 16th at Yeovil.

The Perak River Hydro-Electric Power Co., Ltd., has sent to its shareholders particulars of a scheme for the reduction of the capital from £1,000,000 to £501,884. It is proposed to effect this by cancelling 425,000 of the 500,000 existing preference shares and 90 per cent. of the issued ordinary capital. The capital will then be increased to £3,000,000. The 4 and 5 per cent. debenture stocks are not affected, but the 7 per cent. debentures and the balance of the existing preference stock will be replaced by ordinary shares. Arrangements are also being made to satisfy the amounts due to the holders of deferred interest warrants. Meetings will be held to consider the scheme on July 31st.

W. & T. Avery, Ltd.—A net profit for the year ended March 31st last of £124,087 is reported, as compared with £102,925 in the previous year. The final ordinary dividend is 10 per cent., making 15 per cent. for the year (same), while the appropriation to reserve is £30,000 (£10,000). A balance of £60,483 is carried forward. The directors propose to capitalise £142,363 of the company's general reserve by distributing to ordinary shareholders one new share for every five shares now held. It is also proposed to transfer £100,000 from the general reserve in connection with the substitution of a contributory scheme for the voluntary staff pension scheme.

The United Dominions Trust, Ltd., reports a profit of £158,683 for the year ended June 30th last to which is added £24,175 brought forward. After deducting directors' fees and income tax there remains a balance of £155,606. The general reserve receives £75,000 and £5,000 is contributed to staff pension fund. The dividend on the "A" shares totals 15 per cent. for the year and that on the "B" shares 5 per cent. £36,856 is carried forward. The subsidiary United Dominions Trust (Electric), Ltd., paid a dividend at the rate of 10 per cent., while Credit for Industry, Ltd., also made further progress, the loans now amounting to £210,524.

The English Electric Co., Ltd., which holds over 99 per cent. of the ordinary shares of Willans & Robinson, Ltd., states that one of the effects of resolutions authorising the payment of a special dividend on the ordinary shares and subsequent winding up which the directors of Willans & Robinson, Ltd., are to put before a meeting on July 29th, would be to set up in the accounts of the English Electric Co. for 1935 a non-recurring credit of approximately £137,000, which would be available for the reduction of the debit balance of the profit and loss account.

E. K. Cole, Ltd., reports a trading profit for the year ended May 31st of £250,178, as compared with £166,618 in the previous year. Details of the dividends appeared in the ELECTRICAL REVIEW of July 5th (p. 33). In addition, a notice has been issued to shareholders giving details of arrangements for increasing the authorised capital from £500,000 to £650,000, and also of a conversion scheme in respect of the unissued 7 per cent. preference shares.

The Canadian Hydro-electric Corporation reports that its consolidated operating revenue and other income (less loss on exchange) during 1934 was $9,360,974, against $9,292,048 in the previous year. Regular quarterly dividends were paid on the 6 per cent. first preferred stock and dividends of $2,000,000 (same) were declared on the second preferred and common stocks. The total consolidated surplus at the end of the year was $4,693,193 (against $6,858,256).

The Melbourne Electric Supply Co., Ltd., is holding an extraordinary meeting on August 2nd to authorise a reduction of capital from £1,750,000 to £1,250,000 by returning to preference shareholders the whole of their capital. The preference capital amounts to £500,000 in £5 shares, which will be repaid at a premium of 5 per cent. in accordance with the articles of association. The capital and premium will be paid in England in English currency.

Companies to be Struck off the Register.—Unless cause is shown to the contrary the following companies will be struck off the Register and dissolved at the expiration of three months from July 2nd:—B. Pope, Ltd.; Choralian Radio, Ltd.; and Cole, Marchent & Morley, Ltd. The following were struck off the Register on July 2nd:—Lamlite Signs, Ltd., and Vampires, Ltd.

Hall Telephone Accessories (1928), Ltd.—In an interim report it is stated that an additional 3½ acres of freehold land has been acquired since the last general meeting. Owing to the increase in the variety of work undertaken it will be necessary to build two further bays, the total cost of the land purchased and of the extra buildings and machinery being about £10,000. All sections of the factory are stated to be fully employed.

The Nigerian Electricity Supply Corporation, Ltd., reports a net profit for the year ended February 28th of £24,909. Of this amount £3,000 is set aside to write down debenture stock discount, and, after allocating sums to sinking fund and income-tax reserve, it is proposed to pay a dividend of 3½ per cent. (against 3 per cent.) on the preferred ordinary shares and to carry forward £8,035, against £6,433 brought in.

The Great Northern Telegraph Company's Holding Company, Ltd., proposes for the year ended June 30th to distribute a total dividend of 23½ per cent. or Danish Kroner 12.69 per share of Kr. 54; to set aside Kr. 500,000 for taxes; and to carry forward Kr. 5,357.47. The dividend will be payable in London at the rate of exchange ruling on the day on which coupons are presented.

London Passenger Transport Board.—The receipts for the week ended June 29th brought the gross aggregate traffic revenue for the year up to £28,020,100, representing an increase of £592,200 over the previous year.

Buenos Aires Lacroze Tramways Co., Ltd.—A meeting of the three classes of debenture holders held on July 3rd sanctioned a supplemental scheme of arrangement approved by the Debenture Holders' Committee.

Electrical Distribution of Yorkshire, Ltd., is maintaining its interim ordinary dividend at 4½ per cent., less tax.

The Yorkshire Electric Power Co. announces an interim ordinary dividend of 3 per cent., less tax (same).

Stocks and Shares

TUESDAY EVENING.

AN outstanding feature of the Stock Exchange Markets is the continued strength of the stocks and shares connected more particularly with the gilt-edged groups. The turn of the half-year has brought in a stream of fresh capital, the investment of which has had its effect upon British Government securities and others of similar calibre. According to rumour, the Government is paving the way for an issue, in the early future, of a substantial part of the sum allocated to the London Passenger Transport Board for electrification of suburban lines and matters connected therewith. Mr. Chamberlain, the Chancellor of the Exchequer, announced in the House of Commons the other night that the outlook remained "persistently and doggedly cheerful." Satisfaction with his speech was emphasised by a further drop in the unemployment figures. The Yorkshire Electric 3½ per cent. debenture stock issued last week at 100 was heavily over-subscribed. Allotments were on a modest scale, especially those made to non-shareholders. The price of the stock has advanced to 7s. 8d. premium.

Cable and Wireless

Cable & Wireless is doing its utmost to ensure the success of the scheme under which the combine will pay 100 for one-third of the preference stock held by a proprietor. At the time of writing, there is still a certain amount of money over, which the combine desires to exchange for shareholders' preference stock. The shareholder asks, reasonably enough, why he should accept 100 when he can get a better price for his stock by selling it in the market? As already indicated here, a measure of self-sacrifice is required in order to ensure the success of the scheme, which success still hangs in the balance. The preference is 10s. lower, the ordinary stocks are unchanged, on the week. Marconi Marines are ⅛ down at 39s. 9d. American Telephone & Telegraph stock at 130¼ shows a gain of 3. International Telephone & Telegraphs are quoted at 10. Mr. Roosevelt appears to be steadily losing prestige in the United States, a fact which acts as something of a bull point for the shares of the American utility companies which, under the President's proposals, would find their scope seriously curtailed for the making of good profits.

British Insulated Deal

British Insulated Cables has bought the "A" deferred shares of the International Automatic Telephone Company from the Associated Telephone & Telegraph Company of Delaware. These "A" shares carry votes equal to the 684,379

issued ordinary shares of £1 each. The International Automatic Telephone is associated with the Automatic Electric Company of Liverpool, and with the Telephone & General Trust. The chairman is Sir Alexander Roger, who is also chairman of British Insulated Cables. The price of British Insulated is unchanged at 4½. International Automatics are lower at 42s. 6d., and the "B" shares at 41s. 3d. This, incidentally, is the latest illustration of the way in which shares in British companies are returning from the United States to our own country. It is seven years since the big movement started for Americans to buy shares in British industrial undertakings, with certain grandiose ideas that need not be recalled. The American collapse came in 1929; and, since then, the British shares have been gradually coming back home, at prices, in the majority of cases, considerably lower than those at which the U.S.A. buyers acquired them.

Transport Stocks

The Southern Railway has brought into operation its new main line electric extension to Eastbourne and other stations, thereby completing a scheme which involved the expenditure of 1½ million pounds. Sir Stephen Killik, Lord Mayor of London and a member of the Stock Exchange Committee, together with the Sheriffs of the City of London, and various officials of the Southern Railway, paid a visit to the South Coast by way of rounding off the completion of the company's plan. London Passenger Transport "C" stock remains at 99. British Electric Traction deferred at 1115 is 20 points down. A rise of 2 in British Columbia Electric preference took the price to within half a point of par.

Captain Hudson, Parliamentary Secretary to Mr. Hore-Belisha, Minister of Transport, said in the House of Commons that the substitution of trolley vehicles for trams would affect 265 million passengers. The scheme, he announced, would be profitable, whatever the opposition said. The Government believed that in five years' time it would begin to pay for itself. It was not a charitable scheme, but a business organisation.

Victoria Falls

A remarkable report has been issued by the Victoria Falls & Transvaal Power Co. Profits last year rose by £41,000 to £402,200. The dividend is maintained at 15 per cent., with the usual bonus of 5 per cent., but, in addition, the shareholders are to receive three bonus ordinary shares in respect of every two shares held. This is to be done by capitalising 1½ million pounds of the reserve. The ordinary shares have jumped to 8½, showing a gain of 30s. on the week. The dividend on the 6 per cent. participating preference is to be maintained at the usual 10 per cent. The actual position of these preference shares becomes, by the way, a matter of considerable interest, particularly in view of the premium of 20s. at which they stand above the par price of £1.

Firm Features

The Atlas Electric report caused a slight dullness in the shares. From 6s. 6d., the prices receded to 5s. 9d., and then rallied to 6s. 4½d. The actual revenue of the Trust improved during the year to March 31st last. Payment of the preference dividend is partially provided from the profits brought forward. British Power & Light are better at 30s. Edmundson's are unchanged at 45s. The company has convened a meeting to be held on July 29th for the purpose of passing a special resolution that will enable arrangements to be made for conversion of the 7 per cent. preference shares into 6 per cent. preference. Crompton Parkinsons, after a fairly interesting week, finished ⅛ higher at 67s. 6d. British Aluminium further advanced to 42s. 6d. before reacting to 41s. Support for these shares has come largely from buyers in the North, who base their hopes upon a probable increase from 7½ to 10 per cent. in the dividend, and, moreover, upon the work which the company is now understood to be obtaining from aeroplane and motor car companies. English Electric preference at 21s. 3d. have risen ⅛. Brush ordinary is 3 points down at 45½.

Reorganisations

The Perak River Hydro-Electric Power Company has now issued its scheme for capital reorganisation, and the proposals are certainly drastic. The chairman, at last October's meeting, foreshadowed the writing-off of capital which was no longer represented by assets. The scheme is of a somewhat intricate nature. The 4 and 5 per cent. debentures are in no way affected, the public interest being largely in the 7 per cent. debenture stock, which came up from 40 at one time this year until it touched 58, from which latter price it has declined to 49. The issued share capital, if and after the reorganisation has been carried through, will be a little over £2,000,000, against an authorised capital of £3,000,000. Besides this, there will be outstanding prior lien debenture and guaranteed debenture stocks. The meetings for consideration of the scheme will be held on the last day of the present month. Holders of the ordinary shares may raise some protest. On August 3rd, in Melbourne, an extraordinary meeting of the Melbourne Electric Supply Company is to take place, for the purpose of passing resolutions reducing the capital. It is proposed that 100,000 preference shares of £5 each shall be paid off at a premium of 5 per cent., the money to be distributed, in England, in English currency.

Share List of Electrical Companies

	Nom.	Dividend 1933.	Dividend 1934.	Price. July 9.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	78/9	+⅛	3 16 5
Brompton Ordinary	1	7	7	34/–	—	4 2 4
Charing Cross Ordinary	1	7	7	34/–	—	4 2 4
Chelsea	1	7	7	34/–	—	4 2 4
City of London	1	7½	7½	36/–	—	4 3 4
Clyde Valley	1	7	8	44/–	+6d.	3 12 0
County of London	1	10½	10½	58/–	+6d.	3 12 5
Edmundson's 7% Pref.	1	7	7	36/–	—	3 16 0
Elec. Dis. Yorkshire	1	9	9	49/-xd	+1/6	3 13 6
Elec. Supply Corporation	1	11	11	3⅛	—	3 11 10
Kensington Ordinary	1	7	7	34/–	—	4 2 4
Lancs Light and Power	1	7½	7½	39/–	—	3 17 0
London Electric	1	7	8	38/–	—	4 4 3
Metropolitan	1	10	10	53/6	—	3 14 9
Midland Counties	1	7	7	39/6	+6d.	3 10 10
Mid. Elec. Power	1	8	8	42/–	+9d.	3 16 0
North Eastern Electric Ordinary	1	6	6	34/6	—	3 9 8
Do. 7% Pref.	1	7	7	36/–	—	3 17 9
Northampton	1	10	10	53/9	—	3 14 1
Notting Hill 6% Pref.	10	6	6	14½	—	4 1 4
North Met. Elec. Ordinary	1	10	10	63/9	—	3 2 6
Do. do. 6% Pref.	1	6	6	32/–	—	3 15 0
St. James and Pall Mall	1	7	8½	34/–	—	4 17 1
Scottish Power	1	8	8	42/6	—	3 15 4
South London	1	7	7	35/–	—	4 0 0
Westminster Ordinary	1	7	7	34/–	—	4 2 4
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	44/-xd	—	3 12 9
PUBLIC BOARDS.						
Central Electricity, 1950–70	Stock	5	5	116½	—	4 5 9
Do. 1955–75	„	5	5	118½	—	4 4 5
Do. 1951–73	„	4½	4½	110	—	4 1 10
Do. 1963–93	„	—	3½	104	—	3 7 0
London & Home Counties, 1955–75	„	4½	4½	112	—	4 0 6
London Passenger Transport, A...	„	—	4½	124½	—	3 12 3
Do. do. B...	„	—	5	127½	—	3 18 9
Do. do. C...	„	3	—	99	—	3 0 7
West Midlands Joint Elec. 1948–68	„	—	5	115	—	4 7 0
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$100	9	9	130½	+3	6 18 6
Anglo-Am. Tel. Pref.	Stock	6	6	116½	—	5 3 0
Do. Def.	„	1½	1½	27½	—	5 9 1
Cable & Wireless 5½% Pref.	„	2¾	4½	102	–½	4 1 10
Do. A. 7½% Ord.	„	Nil	Nil	28	—	—
Do. B. Ord.	„	Nil	Nil	9	—	—
Globe Tel. & Tel. Ord.	10	2½	3½	15½	–½	2 6 0
Do. do. Pref.	10	6	6	14½	—	4 2 9
Great Northern Tel.	10	20	20	39	—	5 5 3
Marconi-Marine	1	10	7½	33/9	–⅛	4 9 0
Oriental Telephone Ord.	1	12	12	3⅛	—	*3 12 5
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	2/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	„	5	5	1115	–20	—
Do. do. Pref. Ord.	„	8	8	176½	—	4 10 8
Brazil Traction	100	—	—	8½	–½	—
Brit. Columbia Elec. Rly. Pfce.	Stock	5	5	99½	+2	5 0 8
Mexican Light Common	100	Nil	Nil	3	—	—
Do. 7% Pref.	100	7	7	4½	–1	—
Do. 1st Bonds	$500	5	5	44½	+2	—
Victoria Falls Ord.	1	20	20	8½	+1½	2 7 0
Yorkshire (West Riding)	1	5	6½	33/9	—	3 17 0
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	10	15	3	—	5 0 0
Assoc. Elec. Ord.	1	4	6	35/–	—	3 8 7
Do. Prf.	1	8	8	37/6	—	4 5 4
Babcock & Wilcox	1	6	8	49/–	—	3 4 8
British Aluminium Ord.	1	5	7½	41/–	—	3 13 2
British Insulated Ord.	1	5	15	4½	—	3 9 9
Brush Ord.	Stock	Nil	Nil	45½	–3	—
Callender's	1	15	15	3½	—	4 0 0
Do. 6½% Pref.	1	6½	6½	31/3	—	4 3 2
Crompton Parkinson Ord.	5/–	—	12½	3⅜	+⅛	0 18 9
Do. 8% Pref.	1	8	8	36/3	—	4 8 5
Edison Swan 1st Pref.	1	7½	7½	27/6xd	+6d.	5 9 0
Electric Construction	1	Nil	3½	23/–	—	3 0 10
Enfield Cable Ord.	1	25	25	5½	—	4 17 6
English Electric	1	Nil	Nil	16/3	—	—
Do. do. Pref.	1	Nil	Nil	21/3	+⅛	—
Ever Ready	5/–	35	35	21/–	–6d.	3 6 8
Ferranti Pref.	1	7	7	28/3	—	4 19 0
G.E.C. Pref.	1	6½	6½	35/–	—	3 14 4
Do. Ord.	1	8	10	58/–	+6d.	3 9 0
Henley's	1	30	30	6⅜	–⅛	4 9 7
Do. 4½% Pref.	5	4½	4½	5½	—	3 16 8
India-Rubber Preferred	1	—	5½	1½	—	4 17 9
Johnson & Phillips	1	5	7½	39/6	–6d.	3 16 0
Siemens Ord.	1	6½	4	1⅛	—	3 7 5
Telegraph Construction	£1	Nil	Nil	1¾	—	—

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

24870. "Method of and apparatus for controlling motors of electrically-driven vehicles." A. W. Manley and E. M. Taunton. September 7th, 1933. (Cognate application 23809-34.) (430029.)

25174. "Method of recording electric modulations with the aid of cathode-ray tubes." Tobis Tonbild-Syndikat Akt-Ges. September 10th, 1932. (429916).

25329. "Installation of electrical appliances." J. L. Musgrave, S. C. Mount and R. Crittall and Co., Ltd. September 13th, 1933. (430075.)

27935. "Electrode arrangements for controlling electric arcs." General Electric Co., Ltd., and W. G. Thompson. October 10th, 1933. (429997.)

30363. "Electric motor control systems." General Electric Co., Ltd., and W. G. Thompson. November 1st, 1933. (430000.)

30922. "Bushing insulators for electrical conductors." Steatite and Porcelain Products, Ltd. (Hermsdorf-Schomberg-Isolatoren Ges.) November 7th, 1933. (430076.)

31441. "Covers or containers for electric switches, socket couplings, and the like." J. A. Crabtree. November 11th, 1933. (430241.)

31753. "Alternating-current signalling systems." L. E. Ryall. November 14th, 1933. (430158.)

34063-5. "Electrical power systems." G. M. Pestarini and A. Tustin. December 4th, 1933. (430008-10.)

34064. "Diesel-electric power systems." G. M. Pestarini. December 4th, 1933. (430009.)

34153. "Electrical storage batteries." D. and B. Electrical Co., Ltd., J. J. O'Hea and R. E. Pearson. December 5th, 1933. (429931.)

34301. "Television systems." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and L. E. Q. Walker. December 6th, 1933. (430161.)

34331. "Electric remote control systems." British Thomson-Houston Co., Ltd. December 10th, 1932. (430014.)

34559. "Protecting means for electric supply mains." Etablissements Merlin and Gerin Soc. Anon. December 9th, 1932. (430017.)

34560. "Combined electric circuit-breakers and plug couplings." A. E. Watkins. December 8th, 1933. (429933.)

34588. "Resilient mountings for electric motors or motor units." Electrolux, Ltd. December 17th, 1932. (429937.)

34622. "Automatic electric switch with alternative manual actuation." Landis and Gyr Akt-Ges. December 23rd, 1932. (Cognate application 34623-33.) (429939.)

34652. "Rubber mixture for purposes of electrical insulation, especially for purposes of marine communication cables." Siemens and Halske Akt-Ges. December 12th, 1932. (430019.)

34729. "Stuffing boxes for electric cables." Telefonaktiebolaget L. M. Ericsson. January 3rd, 1933. (429945.)

34730. "Leading-in insulators." Telefonaktiebolaget L. M. Ericsson. January 18th, 1933. (429946.)

34867. "Party-line telephone systems." Standard Telephones and Cables, Ltd., A. M. Searle and E. M. S. McWhirter. December 11th, 1933. (429953.)

34916. "Electric welding machines." T. F. Holden. December 12th, 1933. (430023.)

34945. "Piezo-electric loud-speakers." Boonton Research Corporation. June 14th, 1933. (430025.)

34953. "Control, indicating, or alarm apparatus for electric supply systems." Siemens Bros. and Co., Ltd., and H. S. Double. December 12th, 1933 (addition to 388772). (Cognate application 15285-34.) (430247.)

34959-60. "Apparatus for producing pulsations in an alternating-current circuit." British Thomson-Houston Co., Ltd. December 23rd, 1932. (430248-084.)

35077. "Electric hot-plates and grillers." English Electric Co., Ltd., and F. Smith. December 13th, 1933. (430086.)

35124. "Measuring instruments equipped with electrically controlled follow-up relay devices." Electroflo Meters Co., Ltd., F. V. A. E. Engel and A. T. Barton. December 13th, 1933. (430089.)

35130. "Machines for jointing the insulation of cable cores." Electrical Research Products, Inc. December 29th, 1932. (430091.)

35202. "Electron emitters and methods of manufacturing same." Standard Telephones & Cables, Ltd. June 30th, 1933. (430169.)

35203. "Activation process for electron emitters." Standard Telephones & Cables, Ltd. June 30th, 1933. (430170.)

35351. "Fusible electric cut-outs." A. F. Bulgin and H. T. Stott. December 15th, 1933. (430095.)

35375. "Mercury thread cut-outs." British Thomson-Houston Co., Ltd., G. S. C. Lucas, and C. G. Mayo. December 15th, 1933. (430253.)

35377 "Electric detector mechanism for track points for railways and the like." A. G. Kershaw and Westinghouse Brake & Signal Co., Ltd. December 15th, 1933. (430254.)

35489. "Aerial systems for use in radio telegraphy, telephony, and television transmission." T. M. C. Lance, D. W. Pugh, and Baird Television, Ltd. December 16th, 1933. (430262.)

35506. "Device for testing the frequency characteristics of film-recorded sound." R. H. Cricks. December 18th, 1933. (430097.)

1934

369. "Television systems." W. R. Bullimore, L. H. Bedford and A. C. Cossor, Ltd. January 4th, 1934. (Addition to 399469.) (430179.)

1119. "Earthing devices for use with electrical systems." London Electric Wire Co. & Smiths, Ltd., and E. L. Wildy. January 11th, 1934. (430040.)

1121. "Fire-alarm systems." W. T. Davie and W. Anderson. January 11th, 1934. (430182.)

1551. "Liquid-level operated electric switches." J. E. W. Ginger. January 16th, 1934. (430101.)

2757. "Multiple-contact electric control boards." G. C. Hagger, S. C. Climpson and H. A. R. Allan. January 26th, 1934. (429955.)

3876. "Liquid insulating compositions for electrical apparatus." British Thomson-Houston Co., Ltd. February 8th, 1933. (430045.)

6369. "Devices for minimising interference with radio-broadcast reception." H. S. Buckley. February 27th, 1934. (430272.)

10815. "Electric-discharge lamps." F. Rother. April 10th, 1934. (429962.)

11658. "Electrical heating elements." H. B. Beer and M. H. Gazan. April 18th, 1934. (Cognate application 13628/34.) (430117.)

13016. "High-frequency oscillation generators." Marconi's Wireless Telegraph Co., Ltd. April 29th, 1933. (430199.)

13756. "Electric oscillating motors." E. Hoogland. May 7th, 1934. (430202.)

15846. "Process of making a preparation for rendering electric lines and cables and other materials non-inflammable and cables treated with such preparation." E. S. Ali-Cohen. May 27th, 1933. (430119.)

17644. "Method of modulation for carrier-wave transmission." J. J. Pohjanpalo. August 29th, 1934. (430210.)

18004. "Dielectric compositions." British Thomson-Houston Co., Ltd. June 17th, 1933. (430121.)

22240. "Cable-connecting devices." G. Steiner. July 29th, 1933. (430127.)

24877. "Cooling devices for vacuum electric-discharge vessels." W. Lehmann. September 19th, 1933. (430129.)

26689. "Welding apparatus." British Thomson-Houston Co., Ltd. September 19th, 1933. (430133.)

28052. "Electric-discharge tubes and similar electric devices comprising caps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 4th, 1933. (430288.)

29593. "Flexible electrical conductors." H. A. Staples. October 16th, 1934. (429977.)

29634. "Cable connectors and junctions with conical contacts." M. A. Sertillange. October 16th, 1933. (Cognate application 29635/34.) (430135.)

31914. "Electrical telemetering apparatus." Siemens & Halske Akt.-Ges. August 11th, 1934. (430294.)

32131. "Telegraph exchange systems." Siemens & Halske Akt.-Ges. November 8th, 1933. (430295.)

33711. "Telegraph repeater circuits." Standard Telephones & Cables, Ltd. July 5th, 1934. (430297.)

33802. "Electric systems for indicating or measuring the flow of liquids." Electroflo Meters Co., Ltd., F. V. A. E. Engel and A. L. Hancock. November 24th, 1934. (430141.)

34736. "Manufacture of electron-emitting electrodes for electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 26th, 1934. (430224.)

35072. "Electrolytic apparatus." Nordiske Fabriker De-No Fa Aktieselskap and C. F. Holmboe. December 6th, 1934. (430225.)

35166. "Sound-recording and reproduction devices." British Thomson-Houston Co., Ltd. December 23rd, 1933. (429987.)

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3570. "Electric air douches." British Thomson-Houston Co., Ltd. February 3rd, 1934. (430232.)

5016. "Electro-acoustic sounding apparatus." G. G. Jacquet and R. E. Badin. March 6th, 1934. (430150.)

5347. "Piezo-electric crystal devices." British Thomson-Houston Co., Ltd. February 23rd, 1934. (429992.)

6292. "Electric-discharge devices." British Thomson-Houston Co., Ltd. February 28th, 1934. (429993.)

15689. "Synchronised electric drives for printing presses and like machines." British Thomson-Houston Co., Ltd. December 2nd, 1932. (Divided out of 33897/33.) (430074.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from July 3rd:—

Silvertown Length-mark. No. 558858. Class 8. Electric cables marked with length indications commencing from the inner end of the coil.—India Rubber, Gutta Percha and Telegraph Works, Co., Ltd., Thames House, Millbank, Westminster, S.W.1.

Philco. No. 559997. Class 8 (lettering and design). Apparatus for use in connection with telephony, telegraphy and television. No. 559998. Class 8 (lettering only). Electric batteries (not for medical purposes).—Philco Radio and Television Corporation of Great Britain, Ltd., Aintree Road, Perivale, Greenford, Middlesex.

Acronal. No. 552957. Class 50. Artificial resin sold in bulk or solid form, solutions of artificial resin for use as an electrical insulating material, &c.—I. G. Farbenindustrie Gesellschaft, Frankfurt, Germany. (British representative: Albert L. Mond, 19, Southampton Buildings, Chancery Lane, W.C.2.)

Acephane. No. 557980. Class 50. Cellulose acetate sold in the form of bales, rods, tubes, sheets and mouldable powders, and articles made therefrom or in which cellulose acetate predominates.—Distillers Co., Ltd., 19, Torphichen Street, Edinburgh.

An All-welded Ship

The *Joseph Medill*, claimed to be the world's largest all-welded ship, was launched from the Wallsend shipyard of Messrs. Swan, Hunter and Wigham Richardson, Ltd., on July 4th. The vessel, which is owned by the Quebec and Ontario Transportation Co., Ltd., of Montreal, is 259 ft. long and will carry 3,100 tons. Butt welding has been used throughout and all deck and refrigerating machinery is electrically driven. The propelling machinery consists of two sets of single acting two-cycle mechanical injection Diesel engines.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alton (HAMPSHIRE).—Houses (70); U.D.C. surveyor.

Barking.—Manor school (£43,645), for E.C., by direct labour; borough engineer.

Bicester.—Houses (46); U.D.C. surveyor

Billingham-on-Tees.—Houses (124), Cowpen Lane; Stephen Coates, Ltd., builders, North Ormesby.

Birkenhead.—Library, Upton; borough engineer. Telephone exchange, Prenton Road, for H.M. Office of Works, King Charles Street, London, S.W.1.

Bournemouth.—Boys' school, Charminster; borough surveyor.

Bradford.—Houses (121), Halifax Road; A. Needham.

Brierley Hill.—Houses (61), Quarry Bank; Arthur Webb & Sons, builders. Cinema, Dudley Road, electrical work, for D. & D. Cinemas, Birmingham.

Bristol.—Reconstruction of civil court, &c., Guildhall; Bernard & Son, quantity surveyors, 26, Orchard Street.

Brixworth (NORTHAMPTONSHIRE).—Houses (39), White Hills Estate; A. Hamson & Son, Ltd.

Bury.—Town hall, Knowsley Street (£161,000); borough surveyor.

Cambridgeshire.—Schools, Papworth and Swavesey; county architect, Cambridge.

Carnforth.—Houses (50), Scotland Road; The Oxcliffe Estate Co., Westgate, White Lund, Morecambe.

Cheltenham.—Houses (126), Whaddon Estate; borough engineer. Aircraft factory, St. Mark's area; J. H. Dowty for Aircraft Components, Ltd. Development of Hatherley Court Estate; G. H. Bayley & Sons. Factory, Swindon Road; Hide & Skin Co., Ltd.

Cheshire.—School (360 places), Cecil Avenue, Ashton-on-Mersey; director of education, Chester.

Chester.—Cinema, Northgate Street and Hunter Street (electrical work), for Odeon Theatres, Ltd., Birmingham.

Clutton.—Houses (24); Thomas and Morgan & Partners, architects, 23, Gelliwastad Road, Pontypridd.

Cockermouth.—Houses (20), Moor Estate; U.D.C. surveyor.

Coseley.—Houses (70), Prince's End; J. P. Clark, architect, Regent Chambers, Wednesbury.

Coventry.—Municipal aerodrome, Baginton; city surveyor.

Crook.—Houses (176); A. W. Ayton, U.D.C. surveyor.

Devonshire.—Grammar School, Plympton, for County E.C.; H. V. de Courcy Hague, architect, 19, Heavitree Road, Exeter.

Dudley.—Houses, Foxyard Estate and Priory Estate; Henry Boot & Sons, Ltd., builders, Sheffield. Cinema, Birmingham Road; Plaza Co.

Durham.—Houses (50), Bearpark; R.D.C. surveyor. Extensions to secondary school, Jarrow-on-Tyne, for County E.C.; F. Willey, architect, 34, Old Elvet, Durham.

Eastbourne.—Cinema and shops, Green Street; J. A. Bacon.

Eccles.—School (720 places), for Borough E.C.; Biram & Fletcher, architects, 17, George Street, St. Helens.

Edinburgh.—Building Canal Basin site for Arthur Ball (Nottingham), Ltd. (£100,000); Stewart Kaye, architect, 14, Hill Street. Modernisation of the Western General Hospital, £120,000 (electrical and X-ray departments); city architect.

Enfield.—Houses (181), Newbury Road; Thos. Anders, 293, Eastern Avenue, Ilford.

Essex.—Agricultural Institute, Writtle (£100,000), senior school, Hornchurch, technical college, Walthamstow, and extensions to Senior School, Maldon (£27,000); county architect.

Eye (NORTHAMPTONSHIRE).—Houses (22), Peterborough Road, for H. W. Bryan.

Friern Barnet.—Extensions to Cambridge Instrument Works, Sydney Road; Eiloart, Son & Inman.

Glasgow.—Buildings, Camburn Street, Shettleston; Peden, Reid & Walker, Ltd. Buildings, Keppochhill Road; Allan Ure & Co., Ltd.

Glossop.—Houses (20), Hadfield, for G. H. Wilson; Middleton Bros., builders.

Hendon.—Houses (46), between Lawrence Street and Highwood Hill, Mill Hill; borough surveyor.

Hereford.—Houses (26), Great Broad Leys Estate, Ross Road; A. Pickles. Factory, Blueschool Street; W. Morgan. Premises for Farrow Bros., Kyrle Street; Bettington & Son.

Hornchurch.—Houses (188), Benhurst Avenue, for R. Costain, Ltd. Houses (164), Rainham Road, for Wood & Wren, Ltd

Hull.—Estate development, Stoneferry Road; N. Easton & Son.

Kempston.—Houses (28); P. W. Cooper, U.D.C. surveyor.

Leeds.—Houses and shops, Moortown Estate; city architect. Building, Town Street, Armley; Dudley Bros. & Co. Cinema, Potternewtown Road; J. Bickler. Estate development, Waincliffe Estate, Dewsbury Road; J. W. Watson & Sons. Renovations and electrically operated curtains, Lyceum Picture House, Cardigan Road; licensee.

Limehurst (ASHTON-UNDER-LYME).—Houses (100), Littlemoss, for A. Morris.

Liverpool.—Houses, Long View Farm Estate, Ruyton, and flats, Highfield Street; housing director, Municipal Annexe, Dale Street. Houses (68), Sefton Road, Maghull; John Escolme, surveyor, 8, Curzon Road, Birkenhead. Factory, Speke, for British International Aircraft Distributing Co., Ltd. School, Lambeth Road; land steward and surveyor.

London.—(CAMBERWELL).—Tenements, Levant Street (£29,559); E. D. Winn & Co., Ltd., 36, Wilton Place, S.W.1. (DEPTFORD).—Three blocks of dwellings (£41,183), Bronze Street area; A. T. Rowley (London), Ltd., builders, Lordship Lane, N.17. (HAMMERSMITH).—Extensions, Public Assistance Institution (£24,136); Bovis, Ltd., 35, High Street, W.1. (LEWISHAM).—Library and baths, Durham Hill (£58,984); Galbraith Bros., Ltd., 71, Waterloo Street, S.E.5.

Manchester.—Houses (22), Blackley Estate; Simms, Son & Cooke, Ltd.

Mayfield (SUSSEX).—Houses (26), St. Dunstan's Croft Estate, for Mayfield Tenants, Ltd.; secretary.

Middlesex.—Children's nursing home, Bedfont (£36,500), for C.C.; clerk, Guildhall, Westminster, S.W.1.

Neath.—Isolation hospital, Tonnauchaf; H. A. Clarke, architect, Gwyn Hall.

Newburn-on-Tyne.—Swimming baths, Throckley; J. Wetherley, U.D.C. surveyor.

Newcastle-on-Tyne.—Church, Ovington Grove; J. and W. Lowry, builders, Corporation Street.

Northampton.—Houses (22), Boughton Green Road; H. Holloway & Son. Houses (140), St. David's Estate; borough engineer.

Norwich.—Houses, Larkman Lane, and Dereham Road; city engineer.

Okehampton.—Houses (26); Huggins Bros., builders, Lydford.

Peterborough.—Houses (300), Eastfield; Messrs. Jellings, builders, Westwood Bridge.

Pontefract.—Houses (42); R.D.C. surveyor.

Portslade.—Soap factory; Ozofine Soap & Products, Ltd.

Portsmouth.—Special instruction school (150 places), Portsdown Hill, for E.C.

Radcliffe.—Houses (166), Dumers Lane housing site; Chas. Tunnah & Sons, builders, Redbank Road, Radcliffe, near Manchester.

Rochester.—Houses (123), Delce Farm Estate; city surveyor.

Romsey.—Houses (86); G. V. Williams, R.D.C. building surveyor, Duttons Road.

Rutherglen.—Cinema, Main Street (£30,000); Vogue Cinema, Ltd., St. Vincent Street, Glasgow.

Scarborough.—Houses (20), and flats; Mollekin Brothers, builders, Rotherham, Maltby.

Sheerness.—Cinema, Broadway, electrical and heating work, for East Kent Cinemas, Ltd.

Sheffield.—Houses (41), Barnardiston Road; W. & E. Sadler, Ltd. Houses (22), Hastilar Road; J. C. Mason. Houses (22), High Storrs Crescent; M. J. Gleeson, Ltd. Houses (20), Ringstead Crescent; T. A. Knowles & Sons.

Shropshire.—Technical College for E.C.; E. Crowder, Ltd., builders, South Road, Birmingham.

Sittingbourne.—Argosy cinema, for East Kent Cinemas, Ltd.

Smethwick (STAFFORDSHIRE).—Houses (58), Uplands and Hales Lane, and additions to the Council House (£55,000); borough engineer. Church, Hales Lane; St. Mark's Council. Extensions to works, Alma Street; Crane Chemical Co., Ltd.

South Shields.—Houses (24), Brownlow Road, Emlyn Road, and Westcott Road; J. S. Fairley, builder, 37, Albemarle Street. Houses, Harton House Road, for Col. R. M. Chapman; F. W. Newby, architect, 37, King Street.

Stockton-on-Tees.—Houses, Norton Road; A. J. Blackett, builder, Norton Road.

Sunderland.—Houses, High Southwick; J. Lewis, borough engineer.

Sutton Coldfield.—Houses (52), Hollond House Estate; borough surveyor.

Swindon.—Houses (116), Walcot Estate; A. J. Colbourne.

Tipton.—Houses (24), Alexandra Road; C. B. Gallie, housing director, Municipal Buildings.

Torquay.—Two senior schools for E.C.

Twickenham.—Houses (58), Nelson Road, for D.S.M. Estates, Ltd.

Warrington.—Factory for gelatine refinery, Lower Rake Street, Helsby, for G. E. Shawcross; Wright & Hamlyn, architects, Winmarleigh Street.

Warwick.—Houses (27), Cape Road, for Coventry Estates, Ltd.

Watford.—Houses (25), First Avenue; A. & L. Wilkins. Houses (50), Tudor Drive; W. J. Rice & Son. Houses (40), Westfield Avenue; Brightman & Pleasants. Municipal buildings; C. Cowles Voysey, architect. Shops, offices and flats, High Street; Prudential Assurance Co., Ltd.

Wellington (SHROPSHIRE).—Houses (76), Slang Lane Estate; William Walker, U.D.C. surveyor.

Wells.—Cinema, Priory Road and Princes Road, for Regal (Wells), Ltd.; secretary.

West Hartlepool.—Bus station for the United Automobile Services, Ltd., Darlington.

West Riding.—Farm institute, Askham Bryan (£84,461), electrical work, and school, Whitwood Mere; director of education, Wakefield.

West Suffolk.—High school for girls, Sudbury; county architect, Westgate Street, Bury St. Edmunds.

Whickham-on-Tyne.—Houses, Dunston and Swalwell; T. Fenbow, U.D.C. surveyor, Council Offices.

Wigtownshire.—Schools, Mahaar and Sandhead, and extensions, Dhuloch School, for County E.C.

Willington.—Houses (30), Rosedale Estate; Hays & Gray, architects, Central Chambers, Wingate, Co. Durham.

Wilmslow.—Houses (300), Pownall Park Estate; E. E. Coleman, Ltd., 11, Washway Road, Sale.

Wiltshire.—Secondary school, Devizes, for County E.C.

Wood Green.—Houses (160), Devonshire Hill; Totteridge Lane Freehold Land Co., Ltd.

Workington.—Houses (50), Salterbeck Estate; borough engineer.

Worsborough (YORKSHIRE).—Houses (106); Bainbridge, Ltd., builders, Doncaster.

Worthing.—Shops, Old Theatre site, Bath place; Universal Estates, Ltd.

York.—Houses (200), and flats, Water Lane; A. P. Houfton & Co., builders, Nottingham.